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## I. RICE (*ORYZA SATIVA*).

### KOME.

Rice is the most important cereal in Japan and is an indispensable means of subsistence, so that extensive tracts of the cultivated land are devoted to producing of this staple grain.

There are two distinct varieties of rice grown in the irrigated land or paddy field called "*Ta*," viz the ordinary rice or "*Uruchi*," *O. Sativa* and glutinous rice or Mochigome *O. Sativa glutinosæ*. Each of these has numerous varieties and sub-varieties already in cultivation and they are constantly augmented by artificial selection or by the accidental discovery of new sorts. Rice is also cultivated to some extent in ordinary dry fields called "*Hata*" and is then known as Upland rice or Okabo, and this too, has several varieties and subvarieties.

Amongst the several varieties and subvarieties of rice cultivated in Japan the following specimens are here exhibited.

- |       |                     |   |
|-------|---------------------|---|
| No. 1 | (a) Rice, husked.   | { Common rice known as Miyako, the<br>produce of Saba-mura, Saba-gun<br>in Yamaguchi prefecture.        |
|       | (b) Rice, whitened. |   |
| No. 2 | (a) Rice, husked.   | { Common rice known as Shiratama,<br>the produce of Inada-mura, Yama-<br>ga-gun in Kumamoto prefecture. |
|       | (b) Rice, whitened. |   |
| No. 3 | (a) Rice, husked.   | { Common rice known as Manganji, the<br>produce of Hazama, Kikuchi-gun<br>in Kumamoto prefecture.       |
|       | (b) Rice, whitened. |   |
| No. 4 | (a) Rice, husked.   | { Common rice known as Yeigo, the<br>produce of Horiye-mura, Wake-<br>gun in Yehime prefecture.         |
|       | (b) Rice, whitened. |   |

- |            |                      |   |   |
|------------|----------------------|---|---|
| No. 5 (a)  | Rice, husked.        | { | Common rice known as Kunitama, the produce of Tafuse-mura, Kumage-gun in Yamaguchi prefecture.        |
| (b)        | Rice, whitened.      |   |   |
| No. 6 (a)  | Rice, husked.        | { | Common rice known as Fusakichi, the produce of Akasaka-gun in Okayama prefecture.                     |
| (b)        | Rice, whitened.      |   |   |
| No. 7 (a)  | Rice, husked.        | { | Common rice known as Oku genzo, the produce of Koshigaya, Minami Saitama-gun in Saitama prefecture.   |
| (b)        | Rice, whitened.      |   |   |
| No. 8 (a)  | Rice, husked.        | { | Common rice known as Sekitori, the produce of Komono-mura, Miye-gun in Miye prefecture.               |
| (b)        | Rice, whitened.      |   |   |
| No. 9 (a)  | Rice, husked.        | { | Common rice known as Nihonsan, the produce of Sasaoka-mura, Kita Kambara-gun Niigata prefecture.      |
| (b)        | Rice, whitened.      |   |   |
| No. 10 (a) | Rice, husked.        | { | Common rice known as Shinshuwase, the produce of Hodzumi-mura, Shimo-Tsuga-gun in Tochigi prefecture. |
| (b)        | Rice, whitened.      |   |   |
| No. 11 (a) | Rice, husked.        | { | Common rice known as Shiraishi, the produce of Fukuda-mura, Tonami-gun in Toyama prefecture.          |
| (b)        | Rice, whitened.      |   |   |
| No. 12 (a) | Mochigome, husked.   | { | Glutinous rice known as Taro-bei, the produce of Koshigaya, Minami Saitama-gun in Saitama prefecture. |
| (b)        | Mochigome, whitened. |   |   |
| No. 13 (a) | Mochigome, husked.   | { | Glutinous rice known as Hosō the produce of Gamō-mura, Minami Saitama-gun in Saitama prefecture.      |
| (b)        | Mochigome, whitened. |   |   |

No. 14 (a) Okabo, husked.	{ Upland rice known as Oiran, the produce of Takinogawa- mura, Kita Toshima-gun, Tokio.
(b) Okabo, whitened.	

Of above mentioned fourteen specimens of rice, the first six varieties are the ordinary rice chiefly cultivated at Kiushiu, Shikoku and Chugoku—the eight central provinces in the main island—and the other five varieties of ordinary rice, viz. No. 7 to No. 11 are produced at several provinces in the northern and eastern parts of the Empire.

The former have large, plump and glossy grains but their taste when cooked being somewhat inferior, they hold in general a secondary position in our market, while the latter have smaller grains than the former, but their taste when cooked being superior, they rank first in the market.

When rice was first exported to foreign countries its chief purpose was for making starch, and only a very little portion of it had been used as food, consequently its external beauty was considered as the first importance in this trade regardless of the good taste of Japanese Rice. This gradually became a custom and now-a-days it lies at an almost unreasonable prejudice in the way of trade. However, turning our eyes to the actual state of consumption of our rice in Europe and America, we notice an undisputable fact that our rice is now mainly consumed as food, frequently making its appearance on luxurious tables as Fancy or Table Rice.

There is no reason whatever, why those varieties of rice which are highly appreciated in Japan are not also appreciated in Europe and America. With this view we have specially exhibited these six varieties of the ordinary rice or Uruchi viz. from No. 7 to No. 11, as specimens for those who might in future demand such varieties of rice which have an unrivalled quality as food.

In boiling Japanese Rice, care must be taken as to the quantity of water to be added, for if excess of water be added the grains of

rice are liable to fall or moulder down into pulp, while if it be properly added, they continue to maintain their form. The suitable quantity of water to be added differs more or less according to the quality of rice but generally speaking, 1.25 part of water to 1 part of cleaned rice by volume may be taken as the standard quantity; and the other important point for cooking rice is that the lid of the vessel or pot must be kept constantly on until boiling is finished.

Varieties No. 12 and 13 are both glutinous rice or “Mochigome” *Oryza sativa glutinosæ* and are chiefly consumed by making them into cakes or “Mochi.” No. 14 is Upland rice or Okabo the chemical compositions of which differ but little, and is generally speaking far inferior in its taste when cooked to that of the ordinary rice grown in paddy fields.

As our rice now occupies one of the most important places among the articles of export, and there still being every prospect of increasing the amount of the export in future, we believe it is not out of place to show the general public; The amount produced; The general condition of export; The cost etc.

The amount produced of all kinds of Rice grown in the Empire varies, more or less, according to the circumstances of the years, and the following table shows the annual yield of husked rice for the period of ten years from 1882 to 1891.

Year.	Produce in Measure. Koku.*	Produce in Weight. Picul.
1882	30,401,029	72,202,444
1883	30,562,392	72,585,681
1884	27,131,087	64,436,333
1885	34,042,773	80,851,586
1886	37,191,424	88,329,632
1887	39,999,199	94,998,098

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\* The weight of husked rice varies from 38-40 Kwamme or 23½-35 piculs, in this calculation 1 Koku is taken as 23.75 piculs.

Year.	Produce in Measure. Koku.	Produce in Weight. Picul.
1888	38,645,470	91,782,991
1889	33,007,566	78,392,969
1890	43,037,809	102,214,796
1891	38,123,548	90,543,427
Average of 10 years.	35,214,230	83,633,796

Export of our rice to foreign countries had ever been strictly prohibited by law, but since this restraint was first taken off by the Government in the year 1872, it became a conspicuously large article of export. The following table shows the quantity and value of rice exported in each year from 1882 to 1891.

Year.	Quantity in Piculs.	Value in Yen.
1882	650,977	1,652,114.94
1883	435,405	1,000,950.16
1884	1,137,260	2,170,385.12
1885	318,041	767,455.52
1886	1,387,989	3,031,433.04
1887	893,253	2,255,196.29
1888	3,313,427	7,421,332.92
1889	3,277,249	7,434,941.48
1890	385,027	1,323,510.67
1891	1,998,648	6,213,494.69

The countries to which our rice is chiefly exported is shown in the following table.

Destination.	1887 Quantity in Piculs.	1888 Quantity in Piculs.	1889 Quantity in Piculs.	1890 Quantity in Piculs.	1891 Quantity in Piculs.
England... ..	267,369	1,624,425	1,648,990	61,677	566,788
U. S. America.	44,716	142,586	188,981	52,060	291,862
Germany ... ..	168,474	425,884	292,374	44,521	260,808
Hong-Kong ... ..	—	—	119,350	40,215	249,531
France ... ..	38,673	245,756	103,096	2,522	224,985
Australia ... ..	138,127	171,049	98,192	141,255	164,768
Canada and British America ... ..	2,508	—	36,446	11,793	32,719
Russia ... ..	34,219	54,350	70,595	18,184	32,092
Austria ... ..	14,198	—	—	1	13,072
Italy ... ..	3,360	131,448	—	86	5,040
Belgium... ..	—	—	3,360	4,200	3,880
Other countries.	181,573	517,885	715,745	8,027	153,055
For ship use ...	36	44	120	485	48
Total ... ..	893,253	3,913,427	3,277,249	385,027	1,998,648

An investigation as to the respective amount of rice exported from various ports in the Empire shows that Kōbe has the largest and Nagasaki comes next, while other ports take very little share of the export. Looking at the present destinations it can be easily seen, that the said two chief ports must naturally continue to have the largest trade in rice. Such ports as Yokohama and Fushiki, however may be expected to have a large export in future, when increased demand of our rice is obtained from North American States and Russia.

Our Rice trade was hitherto confined to only the six treaty ports, viz. Ōsaka, Yokohama, Kōbe, Niigata, Hakodate and Nagasaki, but in the year 1889 the following ports were opened as special ports for the exportation of Rice, giving no small degree of interest and facility to the shippers, viz. Yokkaichi,

Shimonoseki, Hakata, Moji, Kuchinotsu, Sankaku, and Fushiki. The annexed table shows the respective amount of Rice exported from the different ports. The latter mentioned special ports are mentioned as “other ports” in the table.

Port.	1887 Quantity in Piculs.	1888 Quantity in Piculs.	1889 Quantity in Piculs.	1890 Quantity in Piculs.	1891 Quantity in Piculs.
Yokohama ...	10,926	54,127	15,406	461	1,068
Kōbe ...	637,706	2,605,338	2,530,073	357,322	1,753,172
Ōsaka ...	850	41	840	1	—
Nagasaki ...	243,418	640,922	692,907	26,082	65,998
Hakodate ...	—	91	—	—	—
Other ports ...	310	12,864	37,903	676	178,362

In any kind of trade, it is an important matter to know, for reference, the real price on which bargains are actually performed. Whereas the price mentioned in the preceeding table having been gathered from the reports made to Custom houses both by sellers and purchasers, there is no means to ascertain the difference of price between different qualities of Rice, so that, we give here the average price list of both husked and whitened Rice, in each year from 1889 to 1892, prepared by Messers The Nippon Beikoku Yushutsu Kaisha, Kōbe.

Year.	Husked Rice per Picul.		Whitened Rice per Picul.	
	1st. Class, Quality.	2nd. Class, Quality.	1st. Class, Quality.	2nd. Class, Quality.
1889	Yen. 2.472	Yen. 2.376	Yen. 3.043	Yen. 2.929
1890	2.967	2.850	3.850	3.750
1891	3.157	3.063	3.845	3.581
1892*	3.220	3.120	3.906	3.826

\* Average of months from January to July.



In order to show the manner of carrying out our Rice trade in Japan, we will mention here the process in Kōbe. Every year, when Kōbe supplied new Rice cargo, the native Rice merchants as a first step, will make samples by mixing suitable varieties and classify their prices according to the various qualities, and they will take these samples to the foreign merchants resident in Japan, who will then enter into contracts according to their judgment. When the agreement is thus settled, it is a usual custom that the canvas bags to pack the rice in and twine to seal the mouth of the bags, are to be supplied by the purchaser. In case of the purchaser being unable to supply them, the seller will provide them charging 14 or 15 Sen\* per piece for first class bags, inferior ranging from 12 to 8 Sen according to the quality, the cost of twine extra. Husked rice must be cleaned twice by means of "Tōmi" or winnowing machine before the rice is put into bags, and when all dirt is taken off, the bags are filled, the mouth being sewed up at the expense of 1 Sen 1 Rin\*\* each. The content of a bag depends upon the purchaser's will, but usually contains 200 lbs. When the bags are sealed they are taken into lighters, and sent off to the ship which will carry them to the Foreign market, paying  $3\frac{1}{2}$  Rin for coolies hire and 9 Rin for lighterage per bag. When all the bags are taken on board ship, the seller will obtain the receipt from the ship, and with this receipt he will apply for the payment to the purchaser. Such being the proceeding mostly adopted by the merchants at Kōbe, there are only a few who feel any direct effect of the difference in freights. The rate of freight, although more or less regulated according to the quantity of cargo, but so far there has been no much difference, 35 shillings per ton on a voyage from Kōbe to London may be taken as a standard rate.

Messers Samuel, Samuel & Co. No. 22, Raspe & Co. No.

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\* 100 Sen = 1 Yen.

\*\* 10 Rin = 1 Sen.

91 and Simon Ever & Co. No. 101 are the chief foreign exporters in Kōbe, while Messers The Nippon Beikoku Yushutsu Kaisha, The Nippon Seimai Kaisha, The Mitsui Bussan Kaisha Kōbe Branch, Yamamoto Seimaijo, Riōyei Kabushiki Kaisha, Sone Chūbei, Katsuki Sonoji, Idzumi Bunshichi, Idzumi Kaichi, Yonesawa Chōjirō, Tanisawa Jirobei, etc. are among the prominent native rice merchants in Kōbe.

In Japan no custom duties are imposed on the foreign export of rice.

The following is the summary\* of the cultivation of the rice grown in paddy fields or “Ta.”

The Choice of Seed:—The seed for sowing ought to be of the best quality, thoroughly matured, quite free from injury and true to its variety. In order to select such genuine seed, there are several methods in practice, the most common of which is that, those grains which are formed at the upper half of healthful and fruitful grown ears are taken as seed, but recently the grains liberated from ears are immersed in a cask filled with cold water or still better with brine, and those which float on the surface of the water are rejected, and those only which sink to the bottom are taken as pure seed.

Steeping:—Seed selected as above described is packed in straw bags and immerced in ponds or rivers or simply steeped in casks filled with water for a varying length of time. For the length of steeping, here again great discrepancy of existing practice occurs; according to the difference of climate and customary mode of cultivation. In some districts, it is steeped as long as 30 days while in others from 7 to 20 days. It is not easy to say which is the best period for steeping the seed, however, many judicious farmers think that 7 days are sufficient for this purpose. The seed thus steeped is then taken out from the water and exposed to the air and partially dried before

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\* Extract of Mr. J. Sawano's essay delivered to Agricultural College. Komaba.

it is sown in the seed bed. In some districts, the seed taken out from the water is spread on mats, and warmed and stirred several times in a sunny place during the day, and at night it is covered with mats to keep warm and this operation is repeated for 3 or 4 days until the seed begins to germinate when it is sown in the seed bed.

Preparation of the seed bed and sowing of seed :—The situation for the seed bed ought to be a sunny place and the soil of good quality. The soil is turned up two or three times with a plough or kind of fork, harrowed several times and reduced to fine tilth, levelled and cleaned as far as possible.

The manures applied to the seed beds are several, but those which are most commonly used are ordure, ashes and green manures. When the seed bed is ready, the seed which has been treated as just mentioned is sown broad cast at the rate of about 3 Gō\* per “Tsubo”\*\* and 8 or 10 of such “Tsubo” serves for the seed plants of one “Tan.”

For watering the seed bed, many different practices are in vogue, but generally speaking, after the seed is sown, water is withheld in the morning, and every evening it is filled with water to the depth of about 2 inches, which is gradually lessened till half an inch when leaves of young plants have grown to the height of about 1 inch.

The drying and watering is repeated every day for about 10 days, and afterwards constantly kept full of water until the young plants are fit for transplantation. The time of sowing in the neighbourhood of Tōkiō is the beginning of May.

Preparation of land for transplanting :—There are two kinds of rice fields in Japan; the one which is suitable for the cultivation of two different crops in a year, and the other which is not fitted for this purpose, on account of too much water existing and this kind is kept fallow except for rice culture.

From the tendency of the latter to retain much moisture, it

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\* 10 Gō = 1 Shō = 1.8 litre.

\*\* 300 “Tsubo” = 1 Tan = 10 are.

is spoken of as watery or low field—"Suiden," and the former for the opposite reason as dry or high field—"Kanden."

The cultivation of these rice fields differs more or less in different localities. In some districts the land is ploughed in the beginning of winter after the harvest of a rice crop, by horse or cattle if the land be of dry character, or turned up by hand if the field be of a marshy character, and left for the weathering influence of the winter months. In other districts, they are winter fallowed without putting any implement to them after harvesting the crop. In other counties, the seed of "genge" *Astragalus Lotoides* is sown in the previous autumn and the plant is ploughed in at the next spring and serves as green manuring. Although it depends much upon the quality of soil and subsoil, but deep cultivation is recommended generally. The usual practice is that, from the beginning of May the land is turned up three times, and cross harrowed several times until the clods are reduced to fine tilth. The manures applied to rice fields are of several kinds, the most common of them, are green manures, farm yard manures, composts, ordures, fish manures, Sake kasu, Shōyu kasu, rape seed cake, and soy bean.

Time of transplanting :—Time of transplanting the rice plant is the next point that claims attention. Here, of course, several modifying circumstances have to be considered, as soil, climate, variety of rice and the state of preparation of the field into which the plants to be transplanted.

The usual practice is that, when the plants in the seed bed have grown to 7 or 9 inches in height they are pulled out and transplanted in the field. The plants take from 35 to 50 days after sowing till this time. In short, the season for transplantation is the beginning of June. Those, however, to whom this method of raising and transplanting the rice plant does not offer sufficient advantages to induce them to undertake the additional trouble and expense may grow rice by sowing seed directly in the field.

Distance between the plants : — Distance between the rice plants transplanted varies widely according to the character of soil and variety of rice. In a fertile soil, when a late variety of rice is cultivated the space of ground allowed to the plants may be wider than the opposite case and vice versa. Generally speaking, from 2 to 8 plants together, according to the variety, are transplanted in rows of from 10 to 12 inches apart and at a distance of from 8 to 12 inches.

Irrigation of rice fields :—Irrigation or watering of the rice fields continues constantly, from transplanting up to about middle of August, except at the time of weeding, when ears of rice plants begin to develope out then no more watering is necessary. But if the soil dries too much, the land is once more irrigated for one or two days at the time of the plant flowering, and on this account, it is called by farmers as flowering water.

Weeding :—Weeding is not mere eradication of noxious grasses but the dried leaves and floating roots of the rice plant are also taken and pushed into the soil by the hand. Weeding commences from two or three weeks after transplantation, irrespective of the presence of weeds, and repeated 3 or 5 times at the intervals of 10 or 15 days. In the time of weeding the water of the field is partially withheld for the convenience of the operation, and some farmers dry their fields one or two days after weeding.

Time of flowering :—The period of inflorescence is the one of the most anxious times of the year for farmers, as the future yield depends greatly upon the conditions favourable or unfavourable under which it is carried on. Wind or wet are alike undesirable at this period. When the season passes safely without atmospheric disturbance, the year is generally anticipated to be fertile, and when the opposite is the case the year is assumed to be unproductive. The time of flowering, generally speaking, takes place in the beginning of September.

Harvesting :—The harvest season extends from the

middle of September for early varieties, to the end of November for late varieties. The rice crop is cut with sickles and dried for some days. For drying, various methods are to be met with in different parts of the country. In some districts, when it is cut it is simply left in swathe for few days while in others it is tied up in sheaves and hung on stretched ropes or on bamboes constructed in the form of great hurdle or ladder for several days. After it is thus dried, it is carried to the barn or any convenient place for future manipulations. Thrashing is performed by drawing rice ears through a frame set with iron teeth specially constructed. The grains thus separated from straw are husked by means of a mill specially constructed with wood and clay, then cleaned by winnowing and passing down riddles.

Produce of rice per 'Tan':—The yield of rice per 'Tan' varies from 4 Koku in good soil to 0.8 Koku in inferior soil, average being about 1.6 Koku.

The following table shows the yearly acreage and produce of three distinct varieties of rice grown in the Empire from 1887 to 1891

Year	Ordinary rice.		Glutinous rice.		Upland rice.	
	Acreage in Chō.	Yield in Koku.	Acreage in Chō.	Yield in Koku.	Acreage in Chō.	Yield in Koku.
1887	391,913	36,675,775	215,701	3,100,153	29,571	223,271
1888	2,440,474	35,401,057	219,321	3,039,254	26,915	205,165
1889	2,429,721	29,767,557	265,503	3,030,600	31,314	209,409
1890	2,442,617	38,846,389	269,978	3,919,923	35,203	271,497
1891	2,447,956	34,317,096	269,181	3,530,411	39,995	276,041

The results of chemical analyses of different kinds of rice performed at the Agricultural College, Komaba in Tokyo are as follows.

	Ordinary Rice or Uruchi.	Upland Rice or Okabo.	Glutinous Rice or Mochigome.
Water.	14.20	12.77	14.48
IN 100 PARTS OF DRY MATTER.			
Crude protein.	9.84	11.27	12.25
Fat.	2.66	2.57	2.84
Crude fibre.	1.45	1.62	1.01
Starch.	77.86	77.34	76.02
Other N. free substances.	10.17	5.91	6.81
Ash.	1.02	1.29	1.07
IN 100 PARTS OF PURE ASH.			
Potosh.	22.94	21.73	22.60
Soda.	4.94	1.59	3.24
Lime.	3.24	2.12	2.10
Magnesia.	10.54	6.61	11.97
Ferric oxide.	1.03	1.66	1.60
Phosphoric acid.	51.37	51.99	52.57
Sulphuric acid.	1.85	2.08	—
Silica.	3.14	9.63	4.66
Chlorine.	1.05	4.49	0.20

The testa or seed coat, commonly known under the name of "Nuka" or rice bran, obtained while whitening the husked rice, is extensively used both as manure and feeding stuff, and it contains the following composition (average of 7 analyses).

Water.	11.33
Crude protein.	13.01
Fat.	15.15

Crude fibre.	6.83
N. free extract.	41.22
Ash.	8.38
Total nitrogen.	2.08
Phosphoric acid.	3.78
Potash.	1.40

## PRODUCTION OF RICE.

### SAKE.

Sake sometimes called rice wine is brewed from the best quality of ordinary rice or “Uruchi.” The ferment or yeast for brewing Sake is called “Kōji”, *Eurotium Oryzæ*. The process of manufacturing Sake is very complicated and requires great skill. Sake which has a good taste and agreeable flavour peculiar to itself is used by all classes of the nation and is an indispensable beverage at marriage and other festival days. When it is used in moderate quantity it promotes good health. The best kinds of Sake are produced in Itami, Nishinomiya and Nada in the province of Settsu.

The amount of Sake produced in each year from 1885 to 1891 is shown in the following table.

1885	2,576,783 Koku.
1886	2,869,050 „
1887	2,981,110 „
1888	3,824,331 „
1889	3,688,330 „
1890	3,065,597 „
1891	3,295,574 „

The quantity of rice consumed for brewing Sake is not small, the following shows the amount in each year from 1885 to 1890.



1885	2,674,478	Koku.
1886	2,960,802	„
1887	3,941,442	„
1888	3,784,282	„
1889	3,132,626	„
1890	3,410,090	„

The specimens of Sake exhibited are as follows :—

(a) Sake, known under the name of “Taichō.”

(b) Sake, known under the name of “Yedakiku-Masamune.”

Taichō (a) is sold by Mr. Kitakaze Teijirō of Hiōgo, its price is 3.00 Yen per dozen, bottles each containing 4 Gō of the Sake, and when more than 100 dozen are bought the price is reduced to 2.20 Yen per dozen.

Yedakiku-Masamune (b) is the manufacture of Mr. Kanō Jiroyemon of Nada and it is sold at Tōkiō by his sole agent Mr. Kajima Seibei. The price per dozen in Tōkiō is 3.68 Yen. The price when sold in casks containing 3.55 “To” was as follows :—

Year.	Price per Cask in Yen.
1888	6.867
1889	5.387
1890	5.848
1891	7.205

Analyses of three kinds of Sake performed by the Sanitary Exp. laboratory in Tōkiō, gave the following percentages.

	(a)	(b)	(c)
Alcohol by weight.	12.0	13.6	9.5
Extractive matter.	2.83	2.9	2.61
Dextrin.	0.22	0.2	0.17
Glucose.	0.54	0.62	0.53
Glycerine.	0.94	0.8	0.64
Free acid.	0.025	0.24	0.30
Ashes.	0.1	0.06	0.05

# MIRIN OR SWEET LIQUOR.

The materials used for manufacturing “Mirin” are Kōji (yeast), glutinous rice and Shōchū or spirit distilled from Sake Kasu—the dregs obtained in the brewing of Sake! Although it is used to some extent as drink, it is mostly applied for flavouring various articles of food by boiling with them.

The amount produced of Mirin in each year from 1887 to 1891 is shown in the following table.

1887	24,724 Koku.
1888	28,242 „
1889	29,399 „
1890	24,442 „
1891	26,281 „

The following specimens of Mirin are exhibited :—

- (c) Mirin, known as Manjiō.
- (d) Mirin, „ „ Manjiō-idzumi.
- (e) Mirin, „ „ Appare.
- (f) Mirin, „ „ Kimigayo.

Of above four specimens of Mirin, the former two are manufactured and sold by Mr. Horikiri Monjirō, and the latter two by Mr. Akimoto Sanzayemon, both are residents of Nagareyama in Chiba prefecture.

The market price of Mirin does not fluctuate as other mercantile articles, the following shows the yearly rate for the four kinds of Mirin from 1887 to 1891, in Tōkiō.

Year.	(c) Manjiō and (e) Appare.		(d) Manjiō-idzumi and (f) Kimigayo.	
	Per 10 casks containing 4 To.	Per dozen of flask containing 4 gō each.	Per 10 casks containing 3.1 To.	Per dozen of flask containing 4 gō each.
1887	Yen. 140.00	Yen. 2.90	Yen. 90.00	Yen. 2.35
1888	137.50	2.80	87.50	2.25
1889	138.75	2.85	88.75	2.30
1890	138.75	2.85	88.75	2.25
1891	138.75	2.85	88.75	2.20

The following shows the chemical composition of Mirin, analyzed at the Agricultural College, Komaba, Tōkiō.

Alcohol by weight.	12.77 %
Sugars.	400.00 grams per litre.
Ashes.	0.97   "   "   "
Total dry matter.	429.00
Free acid as acetic acid.	traces.
Specific gravity.	1.1280

#### RICE STRAW.

The rice straw produced in Japan, the byproduct of rice amounts to not less than 4,100,000,000 Kwamme or 15,270,000 Tons. Rice straw is utilized in Japan in various ways, such as in bags for keeping and transporting cereals, root crops etc., for making various kinds of ropes and cordages, mats, "Mino" or rain coats, sandals known as "Zōri" and "Waraji," thatching roofs, making summer hats and other straw work. It is also largely used both as fodder and litters for houses and cattle.

It has recently been largely consumed in manufacturing straw pulp, which mixed with other kinds of fibres is largely used for manufacturing printing paper. Until a few years ago, nearly all printing paper used for news papers, journals, etc. was imported from foreign countries, but, at present, almost all demands are supplied with the home made article, and there is every hope that in future, it may be exported to foreign countries, on account of the cheapness and easiness of obtaining the materials.

The following is the list of the specimens of rice straw and its manufactures:—

(g) Rice straw, produced in the vicinity of Tōkiō.

(h) Rice straw pulp, manufactured at Yeishin-sha of Nishinari-gun, Ōsaka.

(i) Rice straw paper, manufactured by Ōji Paper Manufacturing Company, Tōkiō.

(s) Rice stalk, a part of straw used for plaiting.

(t) Rice straw plait (3 kinds), made by prisoners in the prison at Yamaguchi.

The price of Rice straw differs greatly according to its quality and in the localities where it is grown, but one Yen per 100 Kwamme may be taken as an average rate.

The price of pulp (h) is 3.3 Sen per lb. in Ōsaka and that of rice straw paper (i) is 5.8 per lb. in Tōkiō.

Rice straw plait (t) of 3 kinds, viz. No. 1 (1,200 Shaku long), No. 3 (800 Shaku long) and No. 5 (720 Shaku long), cost, respectively, 6.600, 3.192 and 1.296 Yen, and each of them is sufficient for making six hats.

#### AME.

The manufacturing of “Ame” in Japan, dates so far back as 100 years before the Christian era, and at early times, sugar being not yet known, Ame was used for flavouring articles of food, and even at present, sometimes it is used in the place of

sugar for cooking. Ame is made of malt and glutinous rice (No. 13 & No. 14).

The specimens of Ame here exhibited are 3 sorts of Okina-Ame and 3 sorts of Awa-Ame or Midzu-Ame, the former has a solid consistency and the latter a viscous nature.

(j) Okina-Ame, of Takata.

(k) Okina-Ame „ „

(l) Okina-Ame „ Tōkiō.

(m) Awa-Ame „ Takata.

(n) Awa-Ame „ Tōkiō.

(o) Awa-Ame „ „

Of the above 6 sorts of Ame, (j) (k) and (m) are manufactured by Mr. Takahashi Magozayemon of Takata, in Niigata prefecture, and (l) (n) and (o) are produced by Mr. Katō Kihei of Nakamonzen, Shiba, Tōkiō.

The following is the price of above 6 kinds of Ame :—

	Yen.	
(j) Okina-Ame.	0.30	per 100 pieces.
(k) Okina-Ame.	0.30	„
(l) Okina-Ame.	1.00	„
(m) Awa-Ame.	0.50	per 10 pounds nett.
(n) Awa-Ame.	0.60	„
(o) Awa-Ame.	0.40	„

Ame being a sweet and agreeable aliment is used by all classes of people; and on account of its being a mild and nourishing food and, at the same time helping digestion, it is largely used by women in childbed, invalids and infants.

It is also used as the ingredient for making various kinds of confectionary. Ame can be preserved for many years without changing, even a little, in its quality.

The following table shows the average percentage composition of “Awa-Ame”.

Water.	15.14
Albumen.	1.16

Fat.	0.04
Dextrin.	33.60
Maltose.	50.05
Ashes.	0.28

(p) Shiratama (Glutinous rice starch).

The method of preparing "Shiratama" is as follows :—The whitened glutinous rice is steeped in water, then ground with some water in a stone mill, filtered through fine sieves, and the filtrate is poured into cotton cloth bags and pressed; until the milky fluid is subsided, and supernatant clear water is poured out and these processes of subsiding and decanting are repeated several times, and finally the starch thus obtained is dried over a charcoal fire.

For preparing Shiratama for food, it is made into dough, and formed into balls of the size of kidney beans, steamed and cooled in cold water or ice, and served with sugar in summer time otherwise it is eaten with soup. It is also used for manufacturing confectionary.

The specimen of Shiratama here exhibited, is produced by Mr. Ōtsuka Jinyemon, Sogamachi in Chiba prefecture, and its price per pound is 5.3 Sen.

(q) Dōmiōji (Steamed and dried rice).

Dōmiōji is prepared by steaming the whitened glutinous rice, drying and grinding it into coarse powder, during about 30 days in the coldest time in winter. The most famous district for its produce from very ancient time is Dōmiōji-mura, Shiki-gun in the province of Kawachi; and the specimen here exhibited is the produce of that district.

For using as food, hot water is poured upon it and before it gets too soft it is eaten with sugar, salt, etc. so that it is a very convenient provision for troops. It is also largely used for making confectionary.

The price per bag containing about  $\frac{2}{3}$  pound is 6 sen.

(r) Kōri-mochi or Frozen Mochi.

Kōri-mochi is one of the famous products of Nagano prefecture. It is prepared from glutinous rice in the coldest time in winter, by steaming the glutinous rice and pounding it in a mortar into thick paste known as “Mochi”, it is dissolved in hot water and filtered through hemp cloth by applying pressure, the filtrate is poured into wooden moulds specially constructed, and frozen upon deep snow and dried by exposure to the sun.

When softened by pouring hot water or made into milky juice by dissolving it in hot water and served with sugar, it makes a very delicious food especially suited for invalids and infants.

The specimen here exhibited is manufactured by Mr. Mayejima Mohei of Nagano and its price per lb. is 18 sen.

## II. BARLEY.

Barely is one of the most important cereal crops next to rice in Japan and is cultivated in almost all provinces, extending from Kiushiu to the Hokkaidō.

The acreage of barley grown in the Empire in the year 1892 is estimated to be 6,513,514 tan or about 651,351.4 hectares.

The following shows the yearly amount of the produce of barley during the last five years ending in 1892.

1888	7,087,150 Koku.
1889	7,190,523 „
1890	5,417,333 „
1891	8,114,959 „
1892	6,789,529 „

The specimens here exhibited are as follows :—

(15) Golden melon (*Hordeum distichum*).

(Produce of Takinogawa-mura Kitatoshima-gun, Tōkiō).

(16) Honkan (*Hordeum hexastichum*).

(Produce of Sanuki-mura Ofura-gun, Gunma prefecture).

(17) Chevalier (*Hordeum distichum*).

(Produce of Sapporo-mura Sapporo-gun, Hokkaidō).

The Golden melon and Chevalier above mentioned, were first introduced from America and Europe, respectively to Japan some years ago.

Barley, either as flour or whole grain, boiled with varying quantities of rice, is used as common food both by farmers and other classes of people in Japan. For this purpose it is whitened like pearl barley, steeped for 5 or 6 hours in water, and then boiled. It is much used as the material for making Miso—Miso is prepared by pounding together boiled soy bean, salt, and the Kōji (yeast)\* prepared from common barley or naked barley, and is one of the most common articles of food in Japan. It is also used for brewing beer, making Ame and several confectionaries and as food for horses and cattle. When its stalk is bleached and plaited it is much used for manufacturing summer hats and several other articles.

Price :—The price of barley in Tōkiō in each year from 1887 to 1891 is as follows :

1887	3.460 Yen per Koku.
1888	3.940 „ „ „
1889	2.240 „ „ „
1890	2.202 „ „ „
1891	3.250 „ „ „

Export :—A small amount of barley is annually exported to foreign countries and its chief destination is Hongkong and Vladivostock.

The following shows the annual quantity and value of barley exported during the last five years.

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\* *Eurotium oryzae*.



Year.	Quantity in Kin.	Value in Yen.
1887	154,607	3,310
1888	979,752	9,034
1889	485,906	4,807
1890	16,450	397
1891	23,073	353

Cultivation:—The time of sowing barley in Japan is generally speaking in the months of October and November. The seed is sown in deeply cultivated and well prepared land in ridges of about 2 Shaku apart, in ordinary dry fields or “hata,” while in well drained paddy fields or “ta,” in ridges of 3-4 Shaku apart. The common manures used for barley crops are ordures, farm yard manure, compost, oil cake, fish manure, rice bran etc. The quantity of seed sown varies from 4-8 Shō per Tan, according to the character of soil and seed. The time of harvesting is from the beginning to the end of June. The average yield of barley is about 1.8 Koku but the produce of certain varieties of barley such as Golden melon and Chevalier in Tōkiō is 2.5-3.0 Koku per tan or 0.3-0.4 Bushels per acre.

## PRODUCTION OF BARLEY.

- |                                       |  |
|---------------------------------------|--|
| (a) Straw (nagawara) for straw plait. | } Produce of Ōmori-mura<br>Yebara-gun Tōkiō. |
| (b) „ (kiriwara) „ „ „ „              |  |

Straw nagawara (a) and kiriwara (b) are the bleached stalks of barley and used as the material for making straw plaits and other straw work. Some farmers bleach barley straw cultivated by themselves in the leisure of field work and sell it to manufacturers of straw plaits, but generally, the farmers after harvesting and thrashing the barley, cut the upper part of the straw to the length of 3 decimeters and sell it to the straw plaiters. Although the straw for plaiting in Japan is not so good as that of Italy, yet it is better in quality than that of China and other countries. In Japan several articles of straw especially playthings have been made of

straw from old time, but recently, on account of straw plait being much exported to foreign countries especially to the United States of America, the manufacturers of the plaits have increased year by year.

The following shows the price per Kuwamme of the straw at Ōmori-mura Yebara-gun, Tōkiō, in 1892.

(a) Straw (nagawara)	{	1st quality	0.50 Yen.
		2nd „	0.35 „
		3rd „	0.25 „
(b) Straw (kiriwara)	{	1st quality	2.00 „
		2nd „	1.70 „
		3rd „	1.00 „

Straw plaits (c)—(u).			Price per 60 Yards.
*(c)	Straw plait (Maruwara)	4 mm.	0.60 Yen.
(d)	„ „ ( „ )	5 mm.	0.60 „
(e)	„ „ ( „ )	6 mm.	0.60 „
(f)	„ „ ( „ )	7 mm.	0.60 „
(g)	„ „ ( „ )	8 mm.	0.60 „
(h)	„ „ ( „ )	9 mm.	0.50 „
(i)	„ „ ( „ )	10 mm.	0.50 „
(j)	„ „ ( „ )	11 mm.	0.40 „
(k)	„ „ ( „ )	12 mm.	0.40 „
(l)	„ „ (Maruwara nokogiriuchi)		0.50 „
(m)	„ „ „ hishiuchi)		0.45 „
(n)	„ „ ( „ nokogiriuchi kobadate)		0.35 „
(o)	„ „ (Wari, 1st quality)	5 mm.	0.45 „
(p)	„ „ ( „ „ „ )	6 mm.	0.45 „
(q)	„ „ ( „ „ „ )	7 mm.	0.45 „
(r)	„ „ (Nijiuuchi)		0.65 „
(s)	„ „ (Hishiuchi)		0.35 „
(t)	„ „ (Mikoba)		0.35 „
(u)	„ „ (Nekoba)		0.45 „

\* c—q are the produce of Kōbe, Hiōgo prefecture; and r—u are that of Ōmorimura Yebara-gun, Tōkiō.

The straw plaits from (c) to (u) are made of the straw (a) and (b). They are used for manufacturing hats and several other straw work.

The plait is mostly exported to the United States of America, England, and France, following one after another of those countries in quantity.

The following table shows the annual quantity and value of straw plait exported during the last five years.

Year.	Quantity in Bundle.*	Value in Yen.
1887	1,232,513	350,450
1888	992,140	268,557
1889	668,763	146,847
1890	425,073	87,196
1891	744,906	193,777

(y) Beer (Brewed by Ōsaka Beer Company at Suita-mura, Shimashimo-gun, Ōsaka).

It was about 16 years ago that beer breweries were first established in Japan, since that time, not only large quantities are brewed for the supply of the home demand but some quantities are exported to foreign countries. Beer (y) here exhibited is brewed at the Ōsaka Beer Brewing Company from barley (a) (Golden melon) produced in Japan.

The price per case containing 4 dozen quarts was 7.80 Yen at Ōsaka in 1892.

### III. WHEAT.

Wheat is one of the most important cereal crops of Japan and is cultivated in nearly all provinces.

The acreage of wheat cultivated in the year 1892 was 4,325,860 Tan or about 432,586 hectares.

The following shows the annual amount of the produce of wheat during the last five years.

---

\* The length of one bundle=60 yards.

1888	3,104,120	Koku.
1889	3,227,745	„
1890	2,455,008	„
1891	3,541,732	„
1892	3,060,217	„

The specimens of wheat here exhibited are as follows :—

(18) Sōshiū.

(Produce of Tomizu-mura, Ashigarashimo-gun, Kanagawa prefecture).

(19) California.

(Produce of Takinogawa-mura, Kitatoshima-gun, Tōkiō). California above mentioned, was first introduced from the United States of America some years ago.

Wheat is used principally for preparing soy, vermicelli, onmen, undon, and several kinds of confectionary. Its straw is used for thatching roofs, litters, etc.

The following shows the percentage composition of wheat analyzed at the College of Agriculture, Komaba, Tōkiō, Japan.

	* Sōshiū.	* Funabashi.	* Iwatsuki.
Water.	12.58	13.53	13.01
Crude protein.	12.35	12.74	12.01
Fat.	1.82	1.73	1.75
Crude fibre.	2.85	2.90	3.08
Nitrogen free extract.	69.48	67.66	68.54
Ash.	1.54	1.64	1.61
Total nitrogen.	1.901	1.954	1.849
Starch.	57.80	54.85	58.35
Weight of 1,000 seeds in grms.)	40.04	35.80	32.76

The yearly average price of wheat during the last five years in Tōkiō is as follows :—

1887	5.266	Yen	per	Koku.
1888	4.980	„	„	„

---

\* These three specimens are especially suited for the preparation of soy.

1889	3.970	„	„	„
1890	4.050	„	„	„
1891	4.160	„	„	„

Wheat is exported both in the form of grain and also as flour ; the former is exported to Hongkong, England, &c., and the latter to Russia, Corea, &c.

The following shows the annual quantity and value of wheat (grain) exported during last five years.

Year.	Quantity in Kin.	Value in Yen.
1887	7,571,407	122,155
1888	12,493,121	205,757
1889	15,270,057	250,773
1890	6,591,008	118,339
1891	2,974,518	68,601

Cultivation :—The mode of cultivating wheat is, in nearly all respects the same as barley, only the time of sowing is a little earlier. The average yield of wheat per Tan is about 1.2 Koku.

## PRODUCTION OF WHEAT.

(v) Onmen (a kind of vermicelli).

(Manufactured and sold by Mr. Ajisaburō Suzuki, Shiroishi-machi, Katta-gun, Miyagi prefecture).

For preparing “ Onmen ” wheat flour is made into dough with brine and it is drawn out into fine threads with a complicated process and cut into certain lengths. “ Onmen ” differs from common vermicelli by not using oil in its preparation.

Onmen as food, is immersed in boiling hot water for about 3 minutes, washed two or three times with cold water and served with soup, or a souce prepared with several flavouring articles and in hot summer days it is cooled in cold water or with ice and eaten with cold sauce.

The price of “ onmen ” at Shiroishi-machi in Miyagi Prefecture in the year 1892 was 11.7 yen per 100 kin.

The average yearly quantity of vermicelli exported to foreign countries amounts to about 200,000 Kin and its chief destinations are Hongkong and Corea.

- |   |  |
|---|--|
| (w) Undon (a kind of macaroni).           | } Prepared by Mr. Nobusada<br>Itō, Sapporo-ku, Hokkaidō. |
| (x) Tamago Undon (a kind of<br>macaroni). |  |

For preparing "Undon" 10 parts of wheat flour and 3 parts of potato starch are kneaded by hand with a certain quantity of brine and rolled, out thin, holded into layers and cut into fine threads and dried by the sun.

For preparing "Tamago Undon," besides above materials, 4 eggs are added for every  $1\frac{1}{4}$  lbs. of wheat flour.

The price of "Undon" at Sapporo in Hokkaido is 6.4 Yen per 100 Kin and that of "Tamago Undon" is 15.0 Yen per 100 Kin.

- (z) Roast fu (prepared by Mr. Torakichi Yoshimura, Kiōto).

The principal constituent of "Fu" is the gluten of wheat. It is prepared by kneading with the feet crude wheat flour—flour containing bran—with brine and washing out the fibres and starch with water, the latter of which is further utilized for many purposes.

The precess of kneading and washing is repeated several times, and the sticky mass remaining is mixed with a certain quantity of the flour of a glutinous rice and a small portion of wheat flour.

The mixture is moulded into various shapes and roasted by a charcoal fire.

The wheat best suited for manufacturing "Fu" is the variety called Sōshiū which is here exhibited.

Roast "Fu" is used as food by boiling it with soup, soy, mirin, etc. For cooking the heavy kind of "Fu" it is recommended to steep it in cold water for about two hours before boiling.

The specimens here exhibited and their price are as follows :—

Tamagawa fu (length of 1.3 Shaku). 0.30 Yen per 10 pieces.

Tamagawa fu (length of 1.3 shaku).	0.15	Yen	per	100	pieces.
Jigami fu.	0.08	"	"	"	"
Yuki.	0.07	"	"	"	"
Chōshi fu (light kind).	0.08	"	"	"	"
" " (heavy kind).	0.30	"	"	"	"
Kosaiku fu.	0.10	Yen	per	1	Shō.
Komomiji fu.	0.08	"	"	"	"

#### IV. NAKED BARLEY (*HORDEUM NUDUM*).

##### HADAKAMUGI.

Naked barley is as equally an important cereal crop as ordinary barley in Japan, so that the tract of land devoted to its cultivation is nearly equal in extent with ordinary barley but it is chiefly grown in the western and southern provinces.

The specimens here exhibited are as follows:—

(20) Hanaoka.

(Produce of Shingū-mura Kasuya-gun, Fukuoka prefecture).

(21) Chōshiū.

(Produce of Takinogawa-mura Kitatoshima-gun, Tokio).

Acreage of naked barley cultivated in 1892 is 6,484,011 Tan.

The following shows the amount produced of naked barley during the last five years.

1888	5,120,388	Koku.
1889	4,898,629	"
1890	2,840,624	"
1891	6,421,282	"
1892	6,042,498	"

Naked barley is used for the same purposes as ordinary barley.

The price per Koku of naked barley during last two years in Tōkiō is as follows:—

1890	4.367	Yen	per	Koku.
1891	4.524	"	"	"

Cultivation:—There is no essential difference in the cultivation of naked barley with that of common barley.

An average yield of naked barley is about 1.8 Koku per Tan.

## V. JOB'S-TEARS (?). (*COIX LACHRYMA*).

### HATOMUGI.

This cereal is cultivated to some extent from a remote age for its having medical properties of strengthening, it was first introduced to Japan from China.

The specimen of "Hatomugi" here exhibited is the produce of Funaho-mura, Imba-gun, in the prefecture of Chiba.

No. 22. Hatomugi, husked.

No. 23. „ „ , husked and whitened.

It is, in fact, one of the most nutritive grains among the cereals, and there is no grain belonging to the natural order Gramineae which comes near it in its quality of containing so large amount of albuminous matter, it also contains a very large quantity of fat and gluten.

The following table shows the chemical composition of husked "Hatomugi." (Analysis made at Agricultural College, Komaba.)

Water.	12.09
In 100 parts of dry matter.	
Crude protein.	19.98
Fat.	6.60
Crude fibre.	0.98
Starch.	62.05
Other N. free substance.	8.91
Ash.	1.48
In 100 parts of the ash.	
Potash.	22.04
Soda.	3.30



Lime.	2.63
Magnesia.	13.33
Ferric oxide.	4.46
Phosphoric acid.	36.82
Sulphuric acid.	4.47
Silica.	10.06
Chlorine.	3.40

This grain is used as food, chiefly, by boiling it mixed with rice, just in the same manner as pearl barley is used.

It is also appropriated as a material for brewing liquors and of manufacturing confectionaries. The grains roasted and coarsely ground are sometimes used as a substitute for tea and coffee.

The following table shows the local price of both husked and whitened "Hatomugi" at Funaho-mura, Imba-gun in Chiba prefecture—for transportation from there to Tōkiō Market requires 25 Sen for every 8.4 To.\* or 151.5 litres.

Year.	Husked Hatomugi per Koku in Yen.	Whitened Hatomugi per Koku in Yen.
1887	5,263	6,993
1888	4,762	6,414
1889	4,762	6,414
1890	9,091	12,121
1891	7,142	9,514
1892	7,142	9,514

Cultivation :—Hatomugi being the most hardy plant of all the grains, is easiest of culture, growing in any description of soil that admits of ploughing, provided more or less manure is applied. The time of sowing is the end of April in the prefecture of Chiba. Four or five grains of seed are dropped by hand in rows of 2.1 Shaku or about 0.64 metre apart at intervals of 0.8 Shaku or 0.24 metre, and ordures and composts are applied, and then covered with soil, and afterward hoed two or three times.

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\* To =  $\frac{1}{10}$  of Koku = 18.04 litres = 0.512 bushel.

It is harvested in the month of September or October.

The usual produce of one "Tan" being 6 Koku or 120 bushels per acre of unhusked grain which yield 1.8 Koku per Tan or 36 bushels of husked grains and when the latter is whitened, it loses again about 20 % in volume.

## VI. SOY BEAN (*SOJA HISPIDA*).

### DAIDZU.

Food prepared from soy bean is extensively eaten by the people of Eastern Asia, and it is natural that such food is especially liked by Japanese who eat very little meat, and chiefly subsist on rice and other vegetables which lack albuminous matter, while it is abundantly contained in the soy bean.

Soy bean has been cultivated in Japan from very ancient times and is produced in almost every part, and it is regarded as one of the most important farm crops. According to the investigation made in the year 1887 the total area of arable land devoted to the cultivation of soy bean is estimated to be 4,633,152 "Tan."

There are many varieties of soy beans in cultivation, having different colours, white, yellow, green, brown, black and dapple, with different sizes and shape.

The specimens of soy bean here exhibited are the following :

No. 24. Soy bean, green (Awo-daidzu). The produce of Akumi-gun, in Yamagata prefecture.

No. 25. Soy bean, black (Kuro-daidzu). The produce of Sapporo-gun in Hokkaidō.

No. 26. Soy bean, common. The produce of Chikuba-gun in Ibaraki prefecture.

No. 27. Soy bean (Itachi-daidzu). The produce of Iruma-gun in Saitama prefecture.

The above mentioned four varieties of "Daidzu" or soy bean are produced in different localities and are those most largely used.

According to the census made in the year 1887 the total produce of soy bean in the Empire is estimated to be 3,253,790 Koku. The following table shows the average market price of soy bean in Tōkiō, in each year from 1887—1891.

1887	4.286	Yen per Koku.
1888	4.180	„ „ „
1889	4.850	„ „ „
1890	5.319	„ „ „
1891	4.912	„ „ „

Daidzu or soy bean is extensively used in Japan, for preparing various kinds of food indispensable for the daily meal, such as soy or “Shōyu”\* “Tamari” (a kind of soy), “Tōfu”\* and “Miso.”\* It is also largely used as food for horses and manure.

The following table shows the percentage composition of 3 kinds of daidzu or soy bean analyzed at the Sanitary Experiment Station at Tōkiō.

	Black kind. Kuro-daidzu.	White kind. Shiro-daidzu.	Green kind. Awo-daidzu.
Water.	11.09	13.46	12.28
Crude protein.	40.25	36.71	42.85
Fat.	18.26	17.43	13.58
Nitrogen-free-Extract.	21.98	24.93	23.68
Fibre,	3.88	2.47	2.91
Ash.	4.55	5.00	4.70

As stated above, “daidzu” is abundantly produced in Japan, but as its consumption by all classes of people for daily use being great, it is now imported from China and Corea in large quantity. In 1891, owing to the general failure of “Daidzu” harvest in the Empire, the total import made during that year amounted to 106,922,922 “Kin” including a small proportion of other beans, with an aggregate value of 2,010,879 Yen. However, none of the imported soy bean or Daidzu has ever been used for the manufacturing of first class “Shōyu” or soy, on account of its

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\* See following pages.

inferior quality to that produced in Japan. Though a large quantity of foreign Daidzu, is imported as above mentioned yet a more or less quantity of Japanese Daidzu, at the same time, is going out to foreign countries.

The following table shows the quantity and value of daidzu exported in each year from 1887—1891.

Year.	Quantity in Kin.	Value in Yen.
1887	38,374	673
1888	84,776	1265
1889	2,108,989	35845
1890	82,373	2031
1891	67,931	1856

## PRODUCTION OF “ DAIDZU ” OR SOY BEAN. SHŌYU OR SOY.

Soy or Shōyu is manufactured in nearly all parts of the Empire as it is absolutely necessary in Japan for cooking fishes, meat, vegetables etc.

The specimens here exhibited are the following.

(a) Shōyu with the trade mark	香	{ Manufactured and sold by Mr. Mogi Shichiroyemon of Noda-machi in Chiba prefecture.
(b) Shōyu „ „ „ „	和	
(c) Shōyu „ „ „ „	國	{ Manufactured and sold by Mr. Mogi Saheiji of Noda-machi in Chiba prefecture.
(d) Shōyu „ „ „ „	金	

All the specimens of “ Shōyu ” exhibited are the produce of Chiba prefecture where an especially large quantity is manufactured and is one of the most noted places for it in Japan. Of the above four kinds of Shōyu (a) and (c) are of first class quality and (b) and (d) the second.

The annual quantity of Shōyu or soy manufactured in Japan from 1887—1891 is shown in the following table.

Year.	Quantity in Koku.
1887	1,180,188
1888	1,304,551
1889	1,233,594
1890	1,157,982
1891	1,199,053

So great is the amount of “Shōyu” manufactured in Japan as stated in the above table, that the total number of manufacturers according to the census made in the year 1889 reached 10,682.

The price of “Shōyu” entirely depends upon the state of the crops of soy bean and wheat. The following table shows the yearly wholesale price of 4 kinds of Shōyu above mentioned in the market of Tōkiō since 1887 to 1892 per 10 casks, each containing 9 “To” or 162 litres and per dozen flasks, each containing 4 “go” or 0.72 litres.

Year.	Shōyu (a) 肴		Shōyu (b) 肴		Shōyu (c) 醬		Shōyu (d) 醬	
	Per 10 Casks.	Per Dozen Bottles	Per 10 Casks.	Per Dozen Bottles	Per 10 Casks.	Per Dozen Bottles	Per 10 Casks.	Per Dozen Bottles
1887	Yen. 12.10	Yen. 1.60	Yen. 10.20	Yen. 1.40	Yen. 12.60	Yen. 1.66	Yen. 9.70	Yen. 1.42
1888	13.30	1.72	11.35	1.60	13.80	1.78	10.85	1.54
1889	13.30	1.72	11.35	1.60	13.80	1.78	10.85	1.54
1890	13.00	1.72	11.20	1.60	13.50	1.76	10.70	1.52
1891	12.92	1.66	11.50	1.50	13.40	1.72	10.50	1.50
1892	13.70	1.78	12.00	1.66	14.20	1.83	11.50	1.60

In manufacturing “Shōyu” or soy, barm is first made by fermenting boiled “Daidzu” or soy beans mixed with parched and coarsely ground barley or wheat. Then the barm is mixed up with brine of a certain strength, previously boiled and cooled, and the mixture is kept for about 25 months, stirring it occasionally with a paddle, say twice a day during winter and three times

in summer, and when it is fermented to the required degree, soy is extracted by means of a soy press. The clear liquid thus obtained is pasturized by heating to about 130° F. and when entirely cooled, it is transferred into casks.

As “Shōyu” is manufactured from “Daidzu,” wheat etc., it naturally contains a large quantity of albuminous matter. Shōyu is used in Japan as table salt as in Europe and America; consequently it is indispensable for daily use for cooking fish, meat, vegetables etc. It has a remarkable merit when applying it in the place of sauces (like “worcestershire,” for beefsteak, fry, stew, etc. It answers better than salt when used with cold meat.

Japanese soy or “Shōyu” has long been exported to various parts of Europe where those who once taste it never fail in extolling its flavour. It is said that in Holland, Japanese soy has been used by many people from long years ago and highly esteemed by them. It can be preserved for several years without the least change of taste, and though it is carried through the tropics it never gives any sign of mustiness or putrefaction nor loses in the least its original taste and flavour.

The following table shows the chemical composition of “Shōyu” analyzed at the Government Medical Experimental Station in Tōkiō:—

Specific Gravity at 21°C.	1,193
Total dry residue in 1 litre.	377,120 Grams.
Albuminous substance.	94,887 „
Ashes.	198,120 „
In ashes sodium chloride or common salt.	165,784 „
Potassium chloride.	12,215 „
Phosphoric acid.	4,664 „

Since the fine flavour of Japanese soy has recently become known to people abroad, several trial consignments were made both to Europe and America, and the result, though it has obtained a high reputation among them, still it has not yet become a leading article of export.

The following table shows the annual amount of soy exported for the period of five years from 1887 to 1891.

Year.	Quantity in Koku.	Value in Yen.
1887	1,302.71	11,091
1888	1,679.61	14,939
1889	1,576.29	16,655
1890	2,136.97	23,772
1891	3,749.01	41,028

It will be seen from above table that though the quantity and value of “Shōyu” or soy is small, yet the trade is growing year after year.

#### TAMARI.

The specimens of “Tamari” here exhibited are the following :—

- |                           |   |   |
|---------------------------|---|---|
| (d) Tamari (dilute)       | { | Manufactured and sold by Mr.<br>Ishima Mosaku, of Yokkaichi in Miye prefecture. |
| (e) Tamari (concentrated) |   |   |

(f) Tamari (common) manufactured and sold by Mr. Morimoto Chōhachi of Yokkaichi, in Miye prefecture.

Tamari is manufactured from “Daidzu” and brine and chiefly produced at the prefectures of Miye, Aichi and Gifu.

It is very much like “Shōyu” or soy in appearance and used for the same purpose. There is only a little difference in preparing Shōyu and “Tamari,” the former has wheat among the materials of manufacture while the latter has no wheat.

(g) Tōfu (bean curd).

Tōfu is one of the most favourite foods of Japanese and sold in all places both in towns and villages. The specimen here exhibited is called Yakidōfu and is prepared by roasting partially dried “Tōfu” over a charcoal fire.

As “Tōfu,” sometimes called bean curd, being a coagulated vegetable albumen of soy beans, it contains a large proportion of

nutritious matter, most important to human life, especially, to those who subsist mainly upon vegetables.

Tōfu is prepared for eating by boiling it for a few minutes with a suitably flavoured sauce. It gives a much better taste when boiled with fish or meat.

The price of canned Yakidōfu here exhibited is 18 Yen per 10 dozen.

The following table shows the percentage composition of Tōfu, analyzed at the Sanitary Experimental Station in Tōkiō.

Water.	88.79
Albuminous matter.	6.55
Fat.	2.95
Nitrogen free extract.	1.05
Fibre.	0.02
Ashes.	0.64

(h) Kōri-tōfu or frozen bean curd. Produce of Minami Adzumi-gun, Nagano prefecture.

Kōri-tōfu is prepared by freezing common "Tōfu" during winter, and when it has congealed it is immersed into fresh water for a little while, and then picked out and dried. The method of cooking it is almost alike with that of Yakidōfu or roast "Tōfu," the only difference being that Kōri-tōfu is softened by steeping it in water before it is boiled. As it can be preserved for many years it is a suitable for provision for vessels undertaking long voyages.

The price of "Kōri-tōfu" here exhibited, per 800 pieces at Minami Adzumi-gun in Nagano prefecture during the last five years is shown in the following table.

Year.	Yen.
1888	0.85
1889	1.10
1890	0.90
1891	0.90
1892	1.00



## VII. ADZUKI (*PHASEOLUS RADIATUS*).

Adzuki is grown in nearly all provinces of the Empire ; Hokkaidō is especially noted for its abundant produce and good quality. It is mostly used for preparing “ An ”—a pulpy mixture of boiled Adzuki flour and sugar, and in that state is largely used for making various kinds of confectionary.

The specimens of “ Adzuki ” here exhibited are as follows :—

No. 28 Adzuki, red, the produce of Hokkaidō.

No. 29 Adzuki, white, the produce of Yomoku-mura,  
Higashi Tagawa-gun, Yamagata prefecture.

The price of the red Adzuki (No. 28) above mentioned is 4.85 Yen per koku at Hokkaidō, and that of the white Adzuki (No. 29) is 8.00 Yen per Koku at Yomoku-mura, Yamagata prefecture.

The following table shows the chemical composition of Adzuki (red) analyzed at Agricultural College at Komaba, Tōkiō.

Water.	12.20
In 100 parts of dry matter.	
Crude protein.	20.84
Fat.	1.62
Crude fibre.	6.89
Starch.	65.38
Other N. free substances.	2.31
Ashes.	2.69
Total nitrogen.	3.33
In 100 parts of pure ash.	
Potash.	45.14
Soda.	2.61
Lime.	3.49
Magnesia.	9.98
Oxide of Iron.	1.09

Phosphoric acid.	33.05
Sulphuric acid.	0.91
Silica.	0.55
Chlorine.	2.36

Cultivation:—The early varieties are sown the end of March or the beginning of April, and the late varieties which are more usually called Aki-Adzuki or Autumn Adzuki are sown the end of June at the rate of 2.0-2.5 Shō per “Tan;” the former is ready for harvesting in the month of July and the latter the end of September.

The yield of red “Adzuki” in the vicinity of Sapporo in Hokkaidō is 1.5—1.8 Koku per Tan and that of white, at the districts of Tagawa-gun, Yamagata prefecture is about 1.7 Koku per “Tan” or about 34 bushels per acre.

## PRODUCTION OF ADZUKI.

(a) Sarashi-an or refined flour of “Adzuki.”

Sarashian is used for preparing various kinds of confectionery and “Shiruko”—a juice prepared by boiling the flour with a suitable quantity of water and by adding sugar at a proportion of about 120 Momme for every 160 Momme of the Sarashi-an. Women and children are especially very fond of “Shiruko.” The specimen here exhibited is manufactured and sold by Nagata Hagemu of Hakodate, Hokkaidō, and its price is 6 Sen per Kin.

Preparation:—For preparing Sarashi-an, well washed “Adzuki” is steamed and crushed in a machine specially constructed, and decorticated by passing through sieves, rinsed out several times in water, pressed in cotton cloth bags and dried over a charcoal fire. It is then ground to fine powder by a stone mill and sifted, and a certain quantity is packed into the paper bags as here exhibited.

# VIII. SASAGE (*DOLICHOS UMBELLATUS*).

There are many varieties and subvarieties of "Sasage" cultivated in Japan; the specimens here exhibited are as follows.

No. 30. Shiro Sasage (white), the produce of Noda-mura, Sōsa-gun, Chiba prefecture.

No. 31. Ordinary red Sasage, the produce of Kawagoye, Iruma-gun, Saitama prefecture.

Sasage is used for preparing "Seki-han"—glutinous rice steamed with "Sasage" and is used customarily at festivals and birthdays—and for making various kinds of confectionary.

The price of white "Sasage" in the districts of Sōsa-gun in Chiba prefecture is 7.00 Yen per Koku, and that of common "Sasage" at Kawagoye in Saitama prefecture is 5.80 Yen per Koku.

The percentage composition of common Sasage (red) analyzed at Agricultural College at Komaba, Tōkiō is as follows:—

Water.	12.05	In 100 parts of pure ash.	
In 100 parts of dry matter.		Potash.	52.79
Crude protein.	25.66	Soda.	1.06
Fat.	2.02	Lime.	4.40
Crude fibre.	7.96	Magnesia.	8.12
N. free substances.	59.41	Oxide of iron.	0.80
Ash.	4.95	Phosphoric acid.	27.16
		Sulphuric acid.	5.93
Total nitrogen.	4.105	Silica.	0.28
N. in amides etc.	0.390	Chlorine.	0.61

The cultivation of Sasage is in nearly all respects the same as that of "Adzuki." Its average yield is also the same as "Adzuki."

## PRODUCTION OF SASAGE.

(a) Ananatto or sugar preserved Sasage.

(b) Tsuyu-shigure or syrup preserved Sasage.

The above two specimens are produced and sold by Mr. Fujita Takijirō of Nishinokubo, Shiba, Tōkiō and the price of the former (a) is 13.5 Sen per Can, and that of the latter 15.0 Sen per Can.

Preparation:—Amanatto is prepared by boiling well washed Sasage in distilled water with sugar and evaporating it to dryness over a charcoal fire, and Tsuyu-shigure is also treated in the same manner as Amanatto but it is not evaporating to dryness, and it is eaten together with the syrupy fluids.

## IX. HARICOT BEAN (*PHASEOLUS VULGARIS*).

### INGEN-MAME.

There are two distinct species of Haricot beans grown in Japan, the one is dwarf, and the other climbing, and each of these species comprises several varieties and subvarieties.

The followings are the specimens here exhibited.

No. 32. Ingen-mame, known as Otafuku.

No. 33. Ingen-mame, „ „ Udzura.

No. 34. Ingen-mame, „ „ Anego.

No. 35. Ingen-mame, „ „ Shiro (white) Ingen.

The above mentioned four varieties of Ingen-mame are the produce of Hokkaidō. The following shows the market price of 4 specimens of “Haricot bean” or Ingen-mame, the first three being the price in Sapporo, Hokkaidō and the last one being that in Tōkiō.

Otafuku-ingen.	7.50	Yen	per	Koku.
Udzura-ingen.	4.70	„	„	„
Anego-ingen.	4.00	„	„	„
Shiro-ingen.	10.30	„	„	„

In some varieties, their fresh unripe pods are eaten as food while in others, the pulse only after ripened is used as food. Besides being used for cooking purposes they are utilized in making various kinds of confectionary.

The seed is sown from the end of April to the middle of June and it is fit for harvesting in the months of August and September. The average yield of three varieties grown in the vicinity of Sapporo, Hokkaidō, are Otafuku 2.0—2.5 Koku, Udzura 2.0 Koku and Anego 1.2—1.5 Koku per “Tan.”

### PRODUCTION OF INGEN-MAME.

(a) Refined Haricot bean flour or “Sarashi-an” made of Shiro Ingen-mame (No. 35).

(b) Refined Haricot bean flour or “Sarashi-an” made of Udzura-mame (No. 33).

(c) Amanatto or sugar preserved Haricot bean.

Of the above mentioned three specimens, the first two (a) and (b) are produced and sold by Mr. Nagata Hagemu of Hakodate, Hokkaidō and the last (c) by Mr. Fujita Takijirō of Nishino-kubo, Shiba, Tōkiō.

The uses and method of preparation of “Sarashi-an” (a) and (b) made of Ingen-mame or Haricot beans are just the same as those already described under the head of Adzuki. VII (a), and also those of Amanatto made of “Ingen-mame” is, in all respect, the same with Sasage Amanatto VIII (a).

The price of these specimen where they are produced is as follows:—

(a) Sarashi-an, of white Ingen-mame 12 Sen per Kin.

(b) Sarashi-an, of Uzura Ingen-mame 12 „ „ „

(c) Amanatto of Ingen-mame 13.5 „ „ „

### . X. PEAS (GREEN).

NO. (36) AWO-YENDŌ (*PISUM SATIUM*).

Peas are one of our ordinary farm crops and is cultivated to more or less extent in every district of Japan. The specimen here exhibited is the produce of Hokkaidō where it is abundantly cultivated and it is noted for its fine quality. Though we have no

accurate statistics of the total amount of the produce at present, yet from the result of investigation made in 1888, it may be estimated to be more than 200,000 Koku.

The price of peas depends much upon the quality. The specimen exhibited costs 4.30 Yen\* per Koku in the market of Sapporo, in Hokkaidō.

(a) Preserved Saya-yendō or green pods of peas.

The specimen of preserved green pods of peas here exhibited is prepared and sold by Mr. Nakagawa Koshichi of Ginza, Tōkiō, and the price is 16 Yen per 10 dozen Cans.

## XI. BUCKWHEAT.

“Soba” *Fagopyrum esculentum*, Mærch. The two specimens and one product, in appendage, are exhibited as in the following:—

No. 37. Buckwheat. Produce of Togakushi-mura, Kami-midsuuchi-gun, Nagano prefecture.

No. 38. Buckwheat. Produce of Tokinogawa-mura, Kitatoshima-gun, Tōkiō-fu.

### PRODUCTION OF BUCKWHEAT.

(a) Kōri Soba (frozen buckwheat cake).—Prepared by Mr. Nakamura Chiyokichi of Kashiwabara-mura, Kami-midzu-uchi-gun, Nagano prefecture.

The two specimens, No. 37 and No. 38, of buckwheat grain differ in quality and in the locality where they are grown. The Japanese are very fond of “Sobakiri” which is made from buckwheat flour. To prepare this diet, the flour is well kneaded, making it into a thick paste by adding a little wheat flour and water; sometimes mixing at the same time, either some eggs, or finely grated root of Yamanoimo (*Dioscorea Japonica*, Thumb.), or green Tea flour to add the flavour. The thick paste is now by means of a wooden roller, spread thin on a wooden board

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\* The rate of price on November, 1892.

and carefully folded to the breadth of about three inches, and cut transversely from one end so as to make the long and thin square threads which are known by the name of "Sobakiri". To serve this, it is once boiled and eat either hot or cold with soy sauce flavoured with various condiments, or boiled with soy together with fried fish, fowl's flesh, eggs, and vegetables &c.

The "Kōri-soba," exhibited as the product of buckwheat flour, is made during severe winter from "Sobakiri" which is prepared as described above. The boiled "Sobakiri" is exposed to severe cold and frozen during the night and then well dried by means of fire, the product being spongy like in texture. This Kōrisoba or frozen buckwheat cake is chiefly produced in the prefecture of Nagano where the low temperature is taken advantage of to let the "Sobakiri" freeze, the thermometer standing at the time about 10° C. below zero. To serve this, it is thrown into boiling water and after about a minute, or two, cold water is poured in. Then, it is taken out of the vessel and washed twice or thrice with cold water and eaten with soy sauce or otherwise variously flavoured. "Kōrisoba" can be stored for any length of time without any change in taste and flavour.

The value of "Kōrisoba" in the place where it is produced is :—

One pound packed in a box of Kiri (*Paulownia Imperialis*)...  
35 Sen.

Two pound packed in a box of Kiri (*Paulownia Imperialis*)...  
65 Sen.

Cultivation :—Buckwheat is sown broadcast or in rows, with ashes and farmyard manure, either at the beginning or middle of March, or at the end of May or at the beginning of August, each maturing at about seventy five days from the time of sowing and consequently it can be raised thrice in a year from the same plot of land, if the district is in the temperate, subtropic or tropic zone. For this purpose, the seed of an early variety known by the name of "Sando-soba" is highly esteemed. It is suited to the light and deep soil of inferior quality, especially to

the soil of old quarternary loam rich in vegetable mold or newly reclaimed and burnt soil of the same nature. The most noted place for the finest quality is Nagano prefecture, the locality where the specimen, No 37, shown is produced.

The average produce of buckwheat is estimated at about  $3\frac{1}{2}$  kilolitres per acre and the total sum for the year 1887 throughout the empire is recorded at 205,535,544 litres.

The local market value of the specimen exhibited during the last six years from 1887 to 1892 per “Koku” (=184 litres) is as follows:—

Market. Years.	Nagano (No. 37).	Tōkiō (No. 38).
1887	4.50 Yen	3.13 Yen
1888	4.50 „	3.70 „
1889	4.50 „	3.57 „
1890	5.00 „	4.55 „
1891	5.00 „	4.17 „
1892	5.70 „	4.17 „

There is also husked grain sold, the price being dearer by about fifty silver Sen, and moreover, it requires 1.66 silver Yen to transport from Nagano to Tōkiō per 880 litres including the expense of packing.

Buckwheat contains a good deal of nutriment and supplies a large part of human food in Japan as well as abroad. In the Japanese Empire it is used as “Sobakiri” or as in cakes by baking. It is also a very valuable food for fowls and also cultivated to a large extent for green manure.

Buckwheat flour has been analysed by the Sanitary Experiment Station at Tōkiō and the following result was as obtained.

Water.	12.90
Crude protein.	13.13
Fat.	2.72
Non-nitrogenous matter.	68.66
Fibre.	1.16
Ashes.	1.43



## XII. RAPE SEED (*BRASSICA CHINENSIS*).

### NATANE.

Rape was formerly cultivated to a great extent but since the introduction of Kerosene Oil, the acreage of its cultivation has been much diminished, yet it is grown in nearly all parts of Japan and forms one of the important farm crops.

No. 39. Rape seed—Medium variety, from

Furumiya-mura, Yasuhachi-gun, Gifu prefecture.

No. 40. Rape seed—Variety known as Shikishima from

Kiotsi-mura, Takashima-gun, Shiga prefecture.

No. 41. Rape seed—Variety known as Hōki, from

Ōyachi-mura, Asaake-gun, Miye prefecture.

No. 42. Rape seed—Early variety, from

Kamisashi-mura, Aidzu-gun, Fukushima prefecture.

Besides the above mentioned four varieties of rape seed, there are numerous varieties and subvarieties in cultivation, differing more or less in their qualities and in time of ripening; but they are all invariably used for expressing oil which is extensively consumed both in town and country. According to a return furnished in the year 1887, the total produce of Rape seed amounted to 1,157,555 Koku.

Rates of price:—The Rape seed is mostly exported from Kōbe to foreign countries, and following table shows the yearly rate of price at Kōbe for the period of six years from 1887 to 1892.

Year.	First quality per Koku.	Second quality per Koku.	Third quality per Koku.
1887	5.70 Yen	5.30 Yen	4.80 Yen
1888	5.50 „	5.20 „	4.70 „
1889	7.20 „	6.60 „	6.00 „
1890	7.00 „	6.40 „	6.00 „

Year.	First quality per Koku. Yen.	Second quality per Koku. Yen.	Third quality per Koku. Yen.
1891	6.20 „	5.70 „	5.20 „
1892	5.50 „	5.00 „	4.70 „

Export:—There is a tendency to increase annually in the export of Japanese rape seed, and its principal destinations are England and Hongkong. Its chief ports of export are Kōbe and Nagasaki. The annual quantity and value of rape seed exported in the last ten years ending in 1891 is shown in the following table.

Year.	Quantities in Kin.	Value in Yen.
1882	1,900	57.000
1883	559,475	11.571
1884	6,570,608	141.320
1885	611,628	13.747
1886	11,509	0.408
1887	138,230	3.689
1888	1,444,639	39.395
1889	6,890,557	231.741
1890	783,073	24.950
1891	6,159,337	187.164

Cultivation:—In Japan, there are two kinds of fields on which rape is cultivated. The one is the ordinary upland field or “Hata” and the other is the rice field or “Ta” which can be well drained and dried when necessary; the former is mostly employed in the north-eastern provinces of Japan, while the latter is in the south-eastern part.

Time of sowing the seed differs in different districts, but generally speaking it takes place from the middle of September to the middle of October.

In the ordinary upland field or “Hata” the seed is sown at the rate of 1.2 Shō\* per acre, on well prepared and manured soil,

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\* Shō =  $\frac{1}{10}$  To =  $\frac{1}{100}$  Koku = 1.8 litres.

in rows of about 2 feet apart and afterward thinned out to a proper distance, hand hoed two or three times at due intervals and the crop is obtained in the month of June in the following year.

In the rice field or "Ta," the land is ploughed up to ridges of 2-4 feet wide as soon as the rice is harvested, and on these ridges the rape plants previously sown in seed beds is transplanted in the month of November or December, and the crop is ready for harvest in the month of June in the following year. Soon after the harvesting of rape, the land is prepared for sowing either cotton seed or transplanting rice plants which have just grown to the suitable size in the seed beds.

## PRODUCTION OF RAPE SEED.

### RAPE SEED OIL "*NATANE ABURA*."

- (a) Common rape seed oil, the produce of Ōsaka.
- (b) Common rape seed oil, the produce of Yokkaichi, Miye prefecture.
- (c) Refined rape seed oil or "Shirashibori Abura" the produce of Ōsaka.

The above specimens of oil are all extracted from rape seed; and the specimens (a) and (b) are most commonly sold in our markets. There is no essential difference in quality of these two specimens of oil the only thing is that, they are produced at different localities. The specimen (c) "Shirashibori Abura" is obtained by refining common rape seed oil and its quality is far superior. All these kinds of rape seed oil are produced at every part of Japan.

According to the result of an investigation made in 1887, the total produce of the oil, in Japan, including "Shirashibori Abura" is said to be 257,124 Koku, with an aggregate value of 4,014,942 Yen.

The following table prepared by the Tōkiō Oil Merchant

Association shows the yearly rate of price at the market of Tōkiō, for the period of six years from 1887 to 1892, per cask of 0.38 Koku or 68 litres.

Year.	Common quality in Yen.	Good quality in Yen.
1887	7.27	7.80
1888	6.75	7.28
1889	9.96	10.49
1890	8.45	8.88
1891	9.90	10.43
1892 (in November).	7.42	7.96

*Note.* The above rates of price have been obtained by averaging the prices on the 1st March and 1st September every year.

The following table given by Mr. Fujita Kinnosuke the Oil Merchant of Tōkiō, shows the annual rate of the wholesale price of “Shirashibori Abura” or refined rapē seed oil for the last ten years ending in 1892, per cask of 0.4 Koku or 72 litres.

Year.	Yen.
1887	8.80
1888	9.80
1889	11.70
1890	12.30
1891	10.51
1892	9.60

Both “Shirashibori Abura” and common rapē seed oil are used as food and for mechanical, lighting, and veterinary purposes. As food it is exclusively used for making “Aburage”—for frying but it is seldom used in first class cooking. In mechanical purpose, it is applied to various machines, wheels etc. as lubricant. As lighting purpose, candles are made of it, besides it is used as lamp oil; though its illumination is far inferior to that of kerosene but no risk of fire is apprehended from this oil. For veterinary purpose, owing to the cheapness of

price it is often used in lieu of olive oil; various ointments and also emulsions are prepared from it.

As an article of foreign export, though the oil has not yet become important yet it is largely exported from Kōbe to Corea, Hongkong, United States of America, Australia, and Russia.

The quantity and value of the export of the oil for each year from 1883 to 1891 is shown in the following table.

Year.	Quantities in Kin.	Value in Yen.
1883	131,870	8,299
1884	105,236	6,583
1885	60,222	3,955
1886	25,136	1,801
1887	23,245	1,442
1888	161,152	10,792
1889	148,567	12,588
1890	79,730	7,934
1891	1,884,832	129,677

### XIII. SESAME. (*SESAMUM INDICUM*).

#### GOMA.

Sesame is grown to a more or less extent, in nearly all parts of Japan as an ordinary farm crop, and especially large quantities are produced in the prefectures of Ibaraki, Tochiki, and Chiba. There are three varieties of sesame, commonly cultivated in the Empire, viz. yellow sesame, white sesame and black sesame.

The specimens of sesame exhibited are the following :—

No. 43. Yellow sesame, “Kigoma.”

No. 44. White sesame, “Shirogoma.”

No. 45. Black sesame, “Kurogoma.”

The above three specimens of sesame are all the produce of Shigura-mura, Shinchi-gun, in the prefecture of Ibaraki.

Of these three varieties, yellow and white sesames are chiefly

used in Japan for expressing oil, while black sesame is exclusively used for cooking purpose either in the grain or after grinding it into coarse powder, and rarely used for expressing oil, in fact, black sesame yields comparatively less quantity of oil than the other two varieties. All kinds of sesame possess a very fragrant scent, so that, when they are mixed with food either in grains or in powders after being parched, furnish an agreeable relish, they are sometimes used as spice.

The chemical analysis of black sesame performed at the Agricultural University, Tōkiō, gave the following percentage composition.

Water.	5.85
In water free substance.	
Crude protein.	20.80
Fat	52.16
Crude fibre & N. free ext.	11.88
Ash.	3.63

For the amount of the produce of sesames there is recently no accurate return, but according to the statistical investigation made in 1888 the approximate amount is said to be about 34,000 Koku.

The yearly rates of the market price of sesames per Koku in Tōkiō, from 1887 to 1891 are given in the following table.

Year.	White Sesame in Yen.	Black Sesame in Yen.
1887	6.557	5.333
1888	6.557	4.544
1889	9.004	6.061
1890	9.756	7.843
1891	8.264	6.897

The above rates of price have been obtained by taking an average of prices at the early part of March and September, every year. The price of yellow sesame is nearly the same with that of white.

Japanese sesames are not yet largely exported. Some years ago only a trial export was first made, but the amount is still very small.

Cultivation :—The seed is sown in the month of April or May in well prepared and manured land, and in good time afterward, the land is hand-hoed two or three times as may be necessary, especially taking care to keep the land free from weeds. At August or September, when some of the first grown capsules are found well ripe and about to shell out their seed, the plant is ready for reaping. When the plants are reaped, they are heaped up on straw mats laid on the ground, and kept two or three days covered with other mats; by this process, the leaves of the plants gradually die away and fall off the stems. The stems with the capsules but liberated from leaves are dried on mats carefully protecting them from wind and wet, and the seed is shaken off on mats as frequently as the drying is carried on, until no more seed remains in the capsules.

#### SESAME OIL.

(a) Oil of yellow sesame

(b) Oil of white sesame.

The above two specimens of sesame oil are manufactured by Mr. Y. Tamura of Iwatsuki, Minami Saitama-gun in the prefecture of Saitama.

Sesame oil is produced in nearly all parts of Japan, but naturally the larger produce is obtained at Chiba, Ibaraki, Tochigi, and Saitama prefectures where the crop is abundantly raised. As to the quality of oil, that produced at Saitama and Tochigi is regarded as the best and that of Ibaraki and Chiba consecutively comes next in order. There is not much difference both in the quality and price between the kinds of yellow and white oil, though the former somewhat surpasses the latter in point of fragrance. In Japan, the oil is mainly used for preparing food, and it is also used for preparing hair oil, surgical ointment, and

lubricating various machines. As an article of food, it is used for making frying “Aburage” etc. and furnishes a superior taste and flavour than any other common vegetable oil and it is an excellent substitute for olive oil. When applied for lubricating purposes it has better merits than rape seed oil, and when used as hair oil, it not only smells sweet but at the same time it renders the hair easy to comb and gives it a glossy look.

The following table prepared by the Tōkiō Oil Merchant Association shows the rates of the market price of the oil produced at Iwatsuki in each year from 1887 to 1892.

Year.	Superior quality per Koku. Common quality per Koku.	
	in Yen.	in Yen.
1887	9.27	8.80
1888	9.46	8.75
1889	14.30	12.78
1890	13.82	12.80
1891	10.50	9.57
1892 (in November).	11.00	10.60

The above rates of price have been obtained by taking an average of prices on 1st of March and September every year.

#### XIV. YEGOMA (*PERILLA OCIMOIDES*, L.).

##### YEGOMA.

No. 46. Yegoma, produce of Kamitsuga-gun Tochigi prefecture.

No. 47. Yegoma, produce of Kita-Aidzu-gun, Fukushima prefecture.

##### PRODUCTION OF YEGOMA.

(a) Yegoma oil, produce of Kami-tsuga-gun, Tochigi prefecture.

(b) Yegoma oil, Kita-Aidzu-gun, Fukushima prefecture.

Yegoma plants (*perilla ocimoides*) are widely cultivated for



the seed in the manufacture of oil. The most noted place, is Tochigi prefecture the district where the specimen No. 46. is produced, and whence a large amount of the oil is supplied to other prefectures. The total produce of seed throughout the Empire is estimated at 7,200 kilolitres. The local average cost per 180 litres in each of the six years from 1887 to 1892 is as follows:—

Year.	Specimen No. 46.		Specimen No. 47.	
1887	4.33	yen.	4.17	yen.
1888	5.10	„	5.00	„
1889	6.25	„	6.25	„
1890	6.02	„	5.56	„
1891	5.38	„	5.00	„
1892	6.17	„	5.26	„

The oil prepared from the seed is extensively used for various industries but it is not exported to foreign countries at present.

Cultivation.—The seed is sown in a nursery bed in May, at the rate of about 0.9 litre per “Tan” sprinkling urine over the bed, and covering lightly with earth.

When the young plants have grown to about fifteen centimetres high, they are transplanted in rows, and after about a week urine is given, and again, after two or three weeks the field is hand hoed giving at the same time liquid manure consisting of water and urine with the admixture of rice bran or powdered rape cake. After the second manuring, hoeing is done twice until the time of harvesting which usually takes place at the end of September or beginning of October the produce being about 198 litres of seed per Tan.

The two products, (a) and (b), exhibited are respectively prepared from the specimen No. 46 and No. 47 differing in no respect in quality but only differ in the locality where they are produced.

One thing to be considered here is that the oils exhibited are

not of superior quality nor specially prepared, they being the common sort sold in the market.

The oil of Yegoma is of a drying character. It stands severe cold without freezing and when mixed with other oils like rape seed oil which freezes easily in winter, at the proportion of about 10 per cent., it does not solidify in cold temperatures. The following statistical returns of six years from 1887 to 1892 from the Tōkiō Oil Merchants Association shows its value per cask containing 72 litres.

Value in Yen.

Year.	Best Goods.	Common Goods.
1887	10.00	9.00
1888	9.10	8.10
1889	11.60	10.60
1890	11.10	10.10
1891	13.45	12.45
1892	10.60	9.60
Average.	10.98	9.98

Extracting the oil.—Yegoma seed contains about 17 per cent. of oil. The seed is lightly charred at first and put into a large wooden mortar in which it is powdered by beating with a wooden pestle; it is then sieved and steamed for several minutes.

The steamed powder is now wrapped with the cloth, woven with the fibre of palmetto (*Chamaerops excelsa*, Thunb.), and the oil is pressed out under a wooden frame.

The proportion of oil extracted from the seed is about 17 per cent. by volume. The expressed oil is now filtered through Japanese paper known by the name of Nishinouchi and it is then the common Yegoma oil of trade.

## XV. HAZE FRUIT (*RHUS SUCCEDANEA*).

No. 48. Budōhaze fruit.

This is a variety of Haze highly esteemed and so-called from the large fruit, which derived the name of Budō meaning grapes and is the produce of Higashi Nogami-mura, Naka-gun, Wakayama prefecture.

No. 49. Haze fruit, the produce of Higashi Nogami-mura, Naka-gun, Wakayama prefecture.

## XVI. LACQUER FRUIT (*RHUS VERNICIFERA*).

No. 50. Lacquer fruit, the produce of Nagaye-mura, Minami-Aidzu-gun Fukushima prefecture.

### PRODUCTION OF HAZE AND LACQUER FRUIT.

- |     |                          |            |     |
|-----|--------------------------|------------|-----|
| (a) | Whitened vegetable wax.— | Trade mark | 大上印 |
| (b) | „ „ „ — „ „              |            | 晶印  |
| (c) | „ „ „ — „ „              |            | 國印  |
| (d) | „ „ „ — „ „              |            | 國印  |

The three specimens (a), (b), and (c) were refined by Mr. Fujita Kinoshige, Tōri street, Nihonbashi-ku, Tōkiō city, and the last specimen (d) the common article of local trade.

(e) Candle, painted.

This is chiefly produced in the district of Aidzu in Fukushima prefecture, and the specimens here exhibited are manufactured and sold by Mr. Matsushita Rihei, of Wakamatsu town, in Kita Aidzu-gun.

(f) Toilet soap.

(g) Washing soap.

The above two specimens of soap are made from vegetable wax by Mr. Suzuki Yasugorō, Nishinokubo street, Shiba, Tōkiō city.

(h) Waxed paper.

(i) " "

The specimen (h) is prepared from paper made from the fibre of *Edgeworthia papyrifera*, and the sample (i) is made by waxing the paper prepared from *Wickstræmia canescens*, var. *Ganpi*, both specimens are manufactured and sold by Mr. Hamada Tomisaburō of Hamachō Nichōme, Nihonbashi-ku, Tōkiō city.

Haze and lacquer fruit are both important raw materials for extracting vegetable wax, the former being chiefly cultivated in the south-eastern provinces, while the latter is produced mainly in the north-western districts. The lacquer fruit is collected chiefly, as a bye product from the lacquer tree cultivated for lacquer. However, both Haze and lacquer trees were highly esteemed as mere sources of vegetable wax, for animal wax had never been used up to a late time, and consequently the local government, in the feudal times, took great care of its cultivation and as a result, trees of many hundred years old, are found even at the present day.

There are no exact statistical notes about the annual produce; yet it is estimated at least as over 45,000,000 kilograms throughout the Empire.

The value of one "Kamme" (=3.75 kilograms) of Haze fruit during the last six years from 1887 to 1892 in the local market is as follows:—

Year.	Budō-haze (No. 37).	Haze (No. 38).
1887	18.0 Yen.	12.2 Yen.
1888	17.0 "	11.3 "
1889	16.0 "	10.9 "
1890	14.5 "	9.7 "
1891	13.8 "	9.1 "
1892	15.0 "	10.0 "

The average value of the last five years of lacquer fruit is reported at 3 Sen per "Shō" on the local market.

It has never been exported in the form of fruit, but as wax which is to be noticed hereafter.

Cultivation.—The Haze trees flourish in a warm soil free from stagnant water and consequently they are extensively planted on hill sides or on the banks of rivers or ponds facing south; though, they are also grown widely on the plains. Plants are raised in a nursery bed. When they are grown to about a foot high, after about three or four years from the time of sowing, they are transplanted, and begin to bear fruit after four or five years from the time of transplantation, but to get the larger produce it requires about fifteen years growth. If there are any plants which do not bear fruit well, they are cut down above the ground and other branches are ingrafted. They bear fruit for a long time, some yielding produce for many hundred years when they are properly cared for. To plant an acre of land, about 100 or 150 young plants are required, giving from 400 to 600 kilograms of fruit when they are fifteen years old.

The method of cultivating of the lacquer trees is nearly the same with the Haze tree. They are grown for two purposes, one being only for the sap and the other both for fruit and sap. They are propagated either from seed, or by cuttings from the old root. For the purpose of the sap only, transplantation takes place when the young plants are about three feet high, and after cultivating seven or twelve years, the lacquer is extracted by boxing the tree. This process is called Koroshigaki. After carefully gathering the lacquer, the trees are cut down above the ground and the old stump soon gives off young and vigorous shoots.

For the fruit and sap, the cultivation is quite the same as for the Haze tree.

Both Haze and lacquer trees are grown with or without manure. The kinds of manure in use are farmyard manure, compost, or night soil, which is given around the root in spring and autumn.

# WAX.

The refined wax shown, as specimens of the product are the refined vegetable wax prepared either from the Haze or lacquer fruit. The four samples from (a) to (d), are made from Budō-Haze (No. 48) or Haze (No. 49) fruit, the quality decreasing from (a) to (d) by degrees. Vegetable wax is produced in almost every part of Japan, among the most noted districts are the provinces on the south-west of the Empire, whence a good deal of vegetable wax is exported. The article fit for export is of the quality seen in the specimen (d) and those of good quality as specimen (a) and (b) are not yet exported.

By the statistical returns of 1887, it is estimated at 10,995,334 kilograms.

Value.—The average value for the five years from 1887 to 1891 per sixty kilograms of whitened wax in Tōkiō market is reported as follows:—

Quality Year.	(a) 大上印	(b) 品印	(c) 關印	(d) 國印
1887	16,580 Yen.	15,920 Yen.	15,764 Yen.	14,953 Yen.
1888	16,754 "	16,161 "	15,920 "	15,238 "
1889	15,025 "	14,688 "	14,467 "	13,559 "
1890	14,286 "	13,617 "	13,333 "	12,698 "
1891	13,169 "	12,598 "	12,403 "	—

Vegetable wax is chiefly employed for the manufacture of wax matches, waxed paper, soap, and candles, and also for giving polish to cotton cloths, and dolls or models as well as for lubricating machinery. In Japan, the fine quality as sample (a) is chiefly used for making pomatum and that of the lower quality for candle making. For the above purposes, it is largely consumed in Hamburg, Paris, and London. In China, Japanese vegetable wax is used for solidifying yellow wax.

Export of vegetable wax.—The annual export is estimated at about 2,400,000 lbs,  $\frac{9}{10}$  of which is exported from Kōbe. The

following list shows the quantities exported and the value for the five years from 1887 to 1891 :—

Year.	Quantities.	Values.
1887	2,196,580 lbs.	326,445 Yen.
1888	2,603,137 „	381,983 „
1889	2,529,694 „	350,641 „
1890	2,048,838 „	266,848 „
1891	2,673,057 „	316,835 „

The chief places of imports are Hongkong, United States of America, France, Germany, and England standing in order as to quantities.

Though Hongkong occupies the first place in quantity, it is not actually consumed there, but it is re-exported to various ports. The principal destinations for export and the quantities and value of the export for the last three years from 1889 to 1891 are shown in the following table:—

destina- tions.	1889		1890		1891	
	Quantities lb.	Value Yen.	Quantities lb.	Value. Yen.	Quantities lb.	Value Yen.
Australia.	9,938	1,432	52,695	6,858	15,598	1,849
Belgium.	31,363	4,431	160	20	24,080	2,833
China .....	36,692	5,625	23,943	3,252	13,499	1,612
H'gkong.	1,298,674	180,502	1,296,084	169,563	2,136,834	254,832
France ...	161,566	21,958	220,746	28,820	95,090	11,263
Germany.	443,057	60,853	134,225	17,595	82,711	9,283
England.	283,577	39,014	64,908	8,396	69,415	7,779
Holland...	7,827	1,100	—	—	—	—
U. S. A. .	249,799	34,715	206,051	25,892	187,735	21,826
India B'sh	4,078	581	21,608	2,926	30,000	3,443
P'ne Isles	1,547	200	25,353	3,149	11,049	1,287
Various S.	1,576	230	3,065	376	7,046	830

Extracting wax :—Both the flesh and seed of the fruit contain wax, but mainly in the former. The fruit is bruised in wooden mortars separating the seed from the flesh by sieving which is then steamed, pressed while hot and the expressed juice is poured

into a wooden mold and left to cool. This is known as the first pressed raw wax. The seed of the fruit is reduced to powder in a stone mill, sieved, steamed, and mixed with the cake of the flesh part, which has been expressed once, and together pressed as before. The product thus obtained is named second pressed raw wax.

To refine the raw wax, it is transmitted into a metal vessel with a small quantity of water and liquefied by the addition of heat. When the raw wax is entirely melted a solution of potash is added, stirred thoroughly, and then transferred into a wooden tank provided with a stop-cock from which it is allowed to fall into a wooden tub partially filled with cold water.

The melted wax, in contact with the cold water in the tub, is soon coagulated and floats on the surface. The floated masses are carefully scooped out by a net of fine mesh and then exposed to sunlight during about ten days sprinkling water from time to time over the wax and thus, the wax is whitened to a certain degree as seen in the sample (*d*) of this product.

Painted candles or Yērōsoku.—The specimen (*e*) exhibited is a product of vegetable wax prepared in Aidzu, Fukushima prefecture from the lacquer fruit (Sample No. 50). However it belongs to art more than to practical use; yet, it is noted for its beauty.

For the manufacture of painted candles it requires a good deal of hand work especially in drawing the pictures on them. Consequently they are not cheap. They are commonly used as ornaments in Buddhist temples and are burnt at religious festivals. They are well fitted for use in religious ceremonies where candles of animal wax are not allowed, the form and picture being made according to the wishes of consumers. Painted candles, manufactured of refined vegetable wax, are noted for the brightness of flame and the unchangeableness of the colour of the pictures.

Value.—They vary much but the price in 1892 on the local market was as follows :—



Large candles, good quality.	0.80 Yen.
„ „ common „	0.50 „
Small „ good „	0.20 „
„ „ common „	0.12 „

Soap.—The soap manufacture in Japan is a new industry, which is carried on according to the method abroad where the raw material for this industry is of animal origin; but the Japanese Empire, being rich in cheap, vegetable wax it is substituted for animal fat. The toilet and washing soap (*f* and *g*), exhibited as specimens are prepared of refined vegetable wax, and are very economical in comparison with soap made of tallow or lard.

Value.—The price wholesale in Tōkiō is as follows:—

Toilet soap.	60 Sen per dozen.
Washing „	40 „ „ „

Mr. Suzuki Yasugorō, the manufactures of the soap are able to supply 500 dozen of each during a week.

Export.—The chief ports of import are China, Hongkong, Corea, and India. The following table shows the export (including soap of animal matter) of five years:—

Years.	Toilet-Soap.		Washing Soap.
	Quantities lb.	Value Yen.	
1887	2,605,287	36,684	4,884 Yen.
1888	2,611,605	35,530	4,651 „
1889	1,546,452	23,244	8,346 „
1890	1,319,343	22,379	12,592 „
1891	1,284,117	30,026	11,755 „

The export duty on soap is 48.23 Sen per 100 lbs.

Waxed Paper.—The specimens (*h*) and (*i*) are made by smearing the vegetable wax (*a*) exhibited upon Japanese paper. It is largely used for wrapping soap, cut tobacco, &c. Japanese paper, as already known, is quite soft, but very tough, and the waxed paper has the same properties which facilitate the

use of it beyond the wax paper from abroad.

The market price of the two specimens in Tōkiō is as follows :—

Waxed paper ( <i>h</i> )	2.25	Yen per 480 sheets.
„ „ ( <i>i</i> )	3.50	„ „ 500 „

## XVII. HEMP (*CANNABIS SATIVA*).

### ASA.

Hemp is cultivated to more or less extent in nearly all provinces of Japan, extending from Kiūshiū in the south-west to Hokkaidō in the north-east. With regard to the fineness of quality and also its strength and durability when manufactured into rope, cordage, twine, canvas, and various cloths etc., the Japanese hemp has no rival in the world but its price being rather high a very little is exported to foreign countries, and on the contrary, recently, hemp raw and manufactured are extensively imported into Japan from China and Philippine Islands, where the price according to its inferior quality is much lower compared with Japanese hemp. Chinese hemp is used in Japan for making kite strings and various rope used for binding cargoes etc., while hawsers and other rope used in merchant vessels, and twine are manufactured with Philippine hemp. However, great inducements both in the cultivation and manufacture of hemp are now given, and there is every reason to expect a time in future, when Japanese hemp of superior quality will be at a much cheaper rate than at present, so as to meet both native and foreign demands.

The following specimens of Japanese hemp are exhibited.

No. 51. Okaji Asa, produce of Kiyosu-mura, Kami-tsuga-gun in Tochigi prefecture.

No. 52. Hikiji Asa, produce of Higashi-Ōashi-mura, Kami-tsuga-gun in Tochigi prefecture.

No. 53. Itazoku Asa, produce of Itako-mura, Kamitsuga-gun in Tochigi prefecture.

No. 54. Kokiso, produce of Mikawa-mura, Takamiya-gun in Hiroshima prefecture.

No. 55. Kokiso, produce of Ichiyama-mura, Ōchi-gun in Shimane prefecture.

The following table shows the produce of hemp fibre in the years 1887 and 1888.

Years.	Quantity in Kwamme.
1887	2,396,856
1888	3,016,172

The rate of price varies greatly according to the quality, the highest reaches to 36 or 37 Yen per 100 Kin while the lowest goes down to 11 or 12 Yen.

The following tables show the latest cost of the five kinds of hemp mentioned above, at the place where they are produced and also the average cost of same throughout Japan and that of Tōkiō, for the period of four years, 1887 to 1891.

Kind of Hemp.	1st Quality per 10 Kwamme in Yen.	2nd Quality per 10 Kwamme in Yen.	Common Quality per 10 Kwamme in Yen.
(a) Okaji Asa.	23.333	20.000	16.666
(b) Hikiji Asa.	15.000	13.333	11.000
(c) Itazoku Asa.	13.333	12.000	10.500
(d) Kokiso, Hiroshima. (Average).	17.000	—	—
(e) Kokiso, Shimane.	„	9.000	—

Year.	Average price through- out Japan per 100 Kin in Yen.	Average price in Tōkiō market per 100 Kin in Yen.
1887	20.450	17.650
1888	19.520	17.480
1889	20.990	16.280
1890	19.480	20.000
1891	.....	19.192

Cultivation:—The soil best suited for hemp, is said to be well drained rich, sandy loam. The method of growing hemp differs more or less according to climate and character of soil, but, generally speaking, the land manured with a heavy dressing of farmyard manure is ploughed up in the month of November, and in March of following year the soil is well pulverized to a fine tilth. In the end of March or the beginning of April the seed is sown in drills of 1 “Sun” deep and 7 “Sun” apart, at the rate of 5 to 6 Shū per “Tan,” so as to drop about 3 seed in 1 “Sun” in the drills, and top dressed with mixed manures composed of about 24 “Kwamme” of fish guano, 40 “Kwamme” of wood ashes and 80 “Kwamme” of ordure, and then thinly covered with soil. The sorts of manures given, of course, differ greatly in different localities. About ten days after germination which usually takes place in a week after sowing, the seedlings which have grown to the height of  $\frac{1}{4}$  to  $\frac{1}{3}$  “Shaku,” are thinned out and afterward the land is hand-hoed and weeded several times at due intervals.

Hemp is ready for harvesting at about 120 days after sowing, about 20th of July. In harvesting, the plants are pulled out, and leaves and roots are cut off with a sickle, and the stems are sorted into long, medium and short kinds according to their length, and bound in bundles of  $\frac{1}{3}$  “Shaku” in diameter. These bundles are steamed for a few minutes in a steaming bath specially constructed, and dried in a sunny situation for three days, when they are fit for keeping to be manipulated according to the condition of weather if favourable or unfavourable. If good settled weather is anticipated, three bundles of the stems above mentioned are made into one bundle, exposed to the sun turning up side down once a day for about three days; then dipped into water and exposed again to the sun for a number of days, until they are completely dried, and they are kept in a dry place for future work.

For preparing the best quality of hemp fibres, the

drying process takes thirty days and for 2nd and 3rd qualities, respectively fifteen and twenty five days are required.

For separating hemp fibres from the stalk, the bundles treated as above mentioned are immersed in water and moderately fermented by heaping them upon a thick bed of straw or straw-mats in a barn specially built for the purpose. The number of hours depend much upon the temperature at that time ; in short, the fermentation requires great skill.

When the stalks are fermented to a proper degree, the fibres are separated by hand and immersed in water, and the outer skin is scraped off also by hand with tools specially constructed, and dried in well ventilated places by hanging the fibres on bamboo, without exposing to the sun.

The produce of hemp fibres varies greatly according to the quality ; the average yield of (No. 51) Okaji, (No. 52) Hikiji and (No. 53) Itazoku is about 12.5 “ Kwamme,” per Tan while that of (No. 54) Hiroshima Kokiso and Shimane Kokiso is, respectively, 17.5 and 22.0 “ Kwamme.”

## PRODUCTION OF JAPANESE HEMP.

( a )	Navy Canvas (No. 1.)
( b )	„ „ (No. 2.)
( c )	„ „ (No. 3.)
( d )	„ „ (No. 4.)
( e )	„ „ (No. 5.)
( f )	„ „ (No. 6.)
( g )	Hemp duck. (No. 7.)
( h )	Hemp thread (No. 16) (dry spinning).
( i )	„ „ (No. 3½) „ „
( j )	„ „ (No. 6½) „ „
( k )	„ „ (No. 23) (wet spinning).
( l )	„ „ (No. 45) „ „
( m )	„ „ (No. 70) „ „

( <i>n</i> )	Hemp thread (No. 4).
( <i>o</i> )	„ „ (No. 8).
( <i>p</i> )	Specimens of hemp ropes (No. 1—No 20).
(	Hemp thread for fishing nets.
( <i>r</i> )	„ „ „ „ „
( <i>s</i> )	„ „ „ „ „
( <i>t</i> )	„ „ „ „ „
( <i>u</i> )	„ „ „ „ „
( <i>v</i> )	Hemp thread for angling.
( <i>w</i> )	„ „ „ „
( <i>x</i> )	Hemp cloth, “Nara-zarashi” 1st quality.
( <i>y</i> )	„ „ “Nara-zarashi” 2nd quality.
( <i>z</i> )	„ „ “Ōmi-zarashi.”
( <i>aa</i> )	„ „ “Ōmi-zarashi.”
( <i>ab</i> )	„ „ for mosquito net.
( <i>ac</i> )	„ „ „ „ „
( <i>ad</i> )	„ „ „ „ „

The varieties of Canvas (*a*) to (*f*) are all manufactured with Japanese hemp, No. 52 Hikiji or No. 53 Itazoku, and on account of their strength and quality they are chiefly supplied to the navy and army. They are used in the navy for making various sails, hammocks, bags for clothes and provisions, etc., and in the army for making tents and other things required for night camps. Besides these mentioned above, Ōmi Hemp Yarn Spinning Co. produces two other inferior kinds of canvas generally known under the name of “Merchant Navy Canvas” and “Navy Canvas” but both of them being almost alike in quality with those made in America and Europe are not exhibited.

The stability, tensility and weight of the above six varieties of canvas manufactured at Ōmi Hemp Yarn Spinning Co. are shown in the following table :—

Number of Canvas.	Lineal Stability Kilogram.	Lineal Tensity Milimetre.	Lateral Stability Kilogram.	Lateral Tensity Milimetre.	Weight of bolt roll of 24 ins. by 36 yards. Kilogram.
No. 1	124	80	195	30	18
No. 2	114	77	167	29	16
No. 3	102	74	144	28	15
No. 4	93	71	126	27	13
No. 5	86	68	113	26	12
No. 6	77	65	100	27	11

*Note* :—The figures given in above table are the results of experiments made with a small piece of the canvas—30 milimetres in width and 300 milimetres in length, so that their intrinsic stability is far more than given in the table and their real tensity is much shorter.

The specimen No. 7 a thick kind of canvas, made of the same material as those above mentioned, is also the produce of the said company and it is chiefly used for the working dress of seamen in the navy, and for beds, working dress of engineering corps, medicine bags, etc. in the Army. The thickness of the cloth may be made as required by any one who orders it. The stability\* of this canvas is 140 kilograms in lateral and 130 kilograms in lineal. Its tensity is 60 milimetres in lateral and 20 milimetres in lineal. The weight of one bolt of 28 inches wide by 36 yards long is 9.5 kilograms.

The following table shows the market price of above mentioned seven varieties of hemp cloth manufactured at Ōmi Hemp Yarn Spinning Co. in the year 1892.

Name of the Articles.	Width and Length of a bolt.	Price per bolt in Yen.
Navy Canvas (No. 1)	2 ft. × 36 yards.	12.50
„ „ (No. 2)	„ × „	12.00
„ „ (No. 3)	„ × „	11.50

\* The figures here given are the result of experiment, made on a cloth of 55 milimetres wide by 300 milimetres long.

Name of the Articles.	Width and Length of a bolt.	Price per bolt in Yen.
Navy Canvas (No. 4)	2 ft. × 36 yards.	11.00
„ „ (No. 5)	„ × „	10.50
„ „ (No. 6)	„ × „	10.00
Hempen duck (No. 7)	2½ ft. × 40 yards.	8.80

Yarn (*h*) is used for weaving the stuff for soldiers' dress. Yarns (*i*) and (*j*) are employed for manufacturing navy canvas. Thread (*n*) is composed of 2 yarns twisted together and is used for making fishing nets. Thread (*o*) is composed of 5 yarns and used for sewing canvas, leather etc. These five kinds of yarns are all made of Japanese hemp, No. 52 Hikiji and No. 53 Itazoku. Yarn (*k*) is also made of No. 52 Hikiji and used for weaving mosquito nets and other hemp stuff. (*l*) and (*m*) are both made of No. 51 Okaji and applied for making "Ômi-zarashi" or "Katabira" cloth.

The following table shows the rate of price of above mentioned eight varieties of yarn which are produced by the Shimotsuke Hemp Yarn Spinning Co.

Kind of Yarn.	Per 100 lbs. in Yen.
( <i>h</i> ) Yarn (No. 16) dry spinning.	28.50
( <i>i</i> ) „ (No. 3½) „ .	21.20
( <i>j</i> ) „ (No. 6½) „ .	22.90
( <i>k</i> ) „ (No. 23) wet spinning.	29.21
( <i>l</i> ) „ (No. 45) „ .	49.82
( <i>m</i> ) „ (No. 70) „ .	92.20
( <i>n</i> ) Thread (No. 4).	28.50
( <i>o</i> ) „ (No. 8).	34.00

The rate of price of various kinds of yarns manufactured by Shimotsuke Hemp Yarn Spinning Co. is given, in the following table.

Numbers of Yarn.	Price per 100 lbs. in Yen.
No. 5.	21.80
No. 10.	24.60
No. 15.	27.80



Numbers of Yarn.	Price per 100 lbs. in Yen.
No. 20.	24.90
No. 25.	31.35
No. 30.	36.35
No. 33.	39.50
No. 35.	40.94
No. 40.	44.02
No. 45.	49.82
No. 50.	56.23
No. 55.	62.70
No. 60.	64.50
No. 65.	77.52
No. 70.	92.20

*Note*:—Though the said company produces different staples of yarn from No. 1 to No. 80, all are not always manufactured, but only those which are in demand in the markets. The price in above tables refer to the year 1892 and only those yarns which secure now-a-days the largest demand in the markets are mentioned.

Specimens of hemp rope (*p*) which comprise 20 different sorts are manufactured by Tōkiō Seikō Kwaisha or Tōkiō Rope Manufacturing Co. These 20 kinds of hemp rope may be divided into two classes, viz. Running and Standing rigging. Generally three strand ropes are used for running rigging, No. 2, No. 3, No. 5, No. 7 and No. 10 to No. 14 belong to this class. The standing rigging are usually of four strand ropes such as No. 1, No. 4, and No. 8. No. 6 is composed of three lines of three strand rope laid up left handed and used for mooring ropes of vessels etc. No. 9 laid up left handed and on account of easy handling being much softer than right handed rope is used for gear of guns etc. No. 15 is twisted in the same manner as No. 6 and used for sea sounding line. No. 16 is used for various purposes but chiefly for fitting standing rigging of vessels. No. 17 is composed of three lines of two strands twisted together and mostly

used for log lines. No. 18 to No. 20 are all small lines and used for serving large ropes to prevent chafing and many other purposes.

Of these specimens of hemp rope, the smaller ones are manufactured with hemp Okaji (No. 51) or Hikiji (No. 52), while the larger ones are made of Itazoku (No. 53).

Besides those varieties of rope above mentioned, the Tōkiō Seikō Kwaisha also manufactures different sorts of rope with Manilla hemp used for mining, civil engineering, and fisheries. The following table shows the price of above twenty sorts of hemp rope.

Number.	Qualities of Rope.	Circumference in Milimetre.	Price per 100 lbs. in Yen.
1	4 strands, white	152	18.25
2	3 strands, pale	140	17.25
3	3 strands, white	127	18.25
4	4 strands, pale	114	17.25
5	3 strands, white	102	18.50
6	9 strands, pale	98	19.25
7	3 strands, white	76	18.50
8	4 strands, white	64	18.50
9	3 strands, left h'ded, p'e.	51	17.75
10	3 strands, white	38	18.75
11	3 strands, pale	29	18.00
12	3 strands, white	25	19.00
13	3 strands, pale	25	18.00
14	3 strands, white	20	21.00
15	9 strands, white	20	22.00
16	9 thread, pale	20	19.75
17	6 thread, white	15	19.50
18	3 yarn, pale	12	19.25
19	2 yarn, white	12	19.20
20	2 yarn, pale	10	19.00

The Hemp thread (*q*) is used for making several kinds of fishing net such as gilt net, casting net etc. (*r*) and (*s*) are also used for netting purposes, especially for eel net and the former is

applied for making a net of fine meshes while the latter for larger nettings, and these two kinds of thread are largely used in Japan. The uses for (*t*) and (*u*) are almost the same as those for (*r*) and (*s*). (*v*) and (*w*) are used for common hand fishing lines. Of these seven specimens of hemp thread, (*q*), (*v*), and (*w*) are manufactured with Okaji (No. 51) (*r*) and (*s*) with Hikiji (No. 52) and (*t*) and (*u*) with Itazoku.

The prices of netting and fishing lines in Tōkiō, in 1892 are as follows :—

Kind of Thread.	Price per 100 " Momme." in Yen.
( <i>q</i> )	1.50
( <i>r</i> )	0.40
( <i>s</i> )	0.30
( <i>t</i> )	0.40
( <i>u</i> )	0.30
( <i>v</i> )	1.80
( <i>w</i> )	1.70

Hemp cloth called Nara-Zarashi (*x*) 1st and (*y*) 2nd quality are both used for summer clothes ; Ōmi-Zarashi (*z*) for making under clothes for summer and (*aa*) for summer clothes, wrapping cloth or Furoshiki, &c. (*ab*), (*ac*) and (*ad*) are used for making mosquito nets. All of these hemp clothes are manufactured either with Okaji (No. 51) or Hikiji (No. 52).

## XVIII. MAO FIBRE (*BOEHMERIA NIVEA*).

No. 56. Mao.—1st quality, produce of Nishi-Iwokawamura, Nishi-Murayama-gun, Yamagata prefecture.

No. 57. Mao.—2nd quality, produce of Nishi-Iwokawamura, Nishi-Murayama-gun, Yamagata prefecture.

No. 58. Mao. Produce of Chatan-magiré, Nakagami, Okinawa prefecture.

### XIX. BANANA FIBRE (*MUSA BASJOO*).

No. 59. Banana fibre. Produce of Nakagusu-magiré, Nakagami, Okinawa prefecture.

### PRODUCTION OF MAO AND BANANA.

(a) Yechigo chijimi (Mao cloth).

(b) Okinawa jyōfu ( „ „ ).

(c) Bashōfu (Broad banana cloth).

The fibre of the Mao excels that of hemp by its flexibility, fineness and high lustre. The finest quality is consumed in weaving costly cloth which is highly esteemed by the Japanese for summer dresses, and that of the low quality is used for making fishing net, angling line &c. The Mao fibre is more or less produced throughout the Empire but the chief prefectures for its production are Yamagata, Fukushima, Niigata, Nara, and Okinawa.

According to the return made in the year 1887 and 1888 the total produce of Mao fibre was :—

Years.	Quantities.
1883	932,426 Kilograms.
1884	899,284 „
1885	—
1886	—
1887	2,422,200 „
1888	505,515 „

Value.—The following list shows the value per 150 kilograms in Nishimurayama-gun, Yamagata prefecture during five years, 1888-1892:—

Years.	Value of Superior Goods.	Value of Medium Goods.
1888	95.39 Yen.	70.00 Yen.
1889	91.71 „	67.26 „
1890	84.90 „	61.30 „
1891	96.83 „	71.03 „
1892	75.00 „	55.00 „

Cultivation and preparing the Mao fibre from the plant :—  
The following brief note is based on the method practised in Fukushima and Yamagata prefectures. *Boehmeria nivea* is a perennial plant and thrives best in hot climates, but fibre of finest quality seems to be raised in colder districts than in warmer places provided that the cultivation, manuring &c. being well organized, which at least, is the fact in Japan, the produce of Okinawa prefecture in the tropic, and Nara prefecture in subtropic regions being bulky but of inferior quality, while in the northern prefectures in subtemperate region yield smaller quantities but of finer quality. In the northern prefectures it is usually harvested once and very seldom twice but in the southern prefectures it can be cut thrice in a year.

Soil fit for the plant is deep gravel loam sloping to the south or on hill sides fully exposed to the sun or warm places with some shelter from strong wind. Such soil gives a fine and strong fibre. If the land is flat and soil clayey, the fibre is weak and rough in quality though the quantity produced is heavy. It is planted once in every six or seven years and even endures and pays well for fifteen or more years if it is carefully treated.

The way of propagation is quite the same with that of the hop plant, that is, it is propagated either by sowing the seed in a nursery bed or by cuttings from the old root; but the common and usual method is the latter. Land to be planted should be deeply plowed and well pulverized. Now long ditches 90 c.m. deep and 60 c.m. wide are dug in parallel rows and filled

up with farm yard manure equally mixed with finely pulverized earth, and then raised into ridges flat on the top the face being about 40 c.m. wide. At the end of March or beginning of April, young shoots which spring out from the old stubbles are cut off with sharp knives and made into cuttings of about 15 c.m. long. These cuttings are inserted on the prepared ridges at the distance of about 10 c.m., leaving about 3 or 4 c.m. of end of the cuttings uncovered with earth. After they are planted water should be sprinkled if the weather is too dry. Weeding is done three or four times during a year. In the first and second year, the plants should never be cut but left to wither and decay, and a top dressing of farm yard manure and compost given. In autumn of the second year the plants are covered, by scattering over them straw or thin branches of trees over which liquid manure is sprinkled after snow has once fallen. Early in the spring of the third year, weeding is performed and at about the beginning of June, the young shoots will have grown to the height of about ten centimetres. At this time, the straw or branch of trees covering them in the previous year, is folked together and dried and burnt. The burning is repeated every year in order to destroy the young shoots because the shoots which come up first will usually yield very small quantity of fibre of inferior quality and moreover the ashes produced by burning will act as manure for after growth.

Thus in the third year, the plant will grow luxuriantly, thickly covering the land and give the first-heavy praduice, manure is given twice, once in June after the burning and next in autumn after the harvest, the quantity and sort of manures being in general as follows :—

Night soil	5.4 Hectolitres per Tan.
Farm yard manure	135 Kilograms „ „

Harvesting :—In the sonthern prefectures harvesting takes place thrice in a year, each respectively at the end of May or begining of June, end of June or beginning of July and end of

July or beginning of August. In the northern prefectures it is harvested only once at the end of August or beginning of September, produce ranging between 56-68 kilograms of fibre per tan when highly cultivated and 15-20 kilograms in ordinary case.

The plants are cut just above the ground, the leaves stripped, the stems sorted and steeped in water before the outer bark is dried. After steeping about ten hours, the stems are taken out and the bark is at once stripped. These raw fibres are made into small bundles and again steeped in water for about two or three hours. The soaked raw fibre is now taken out from the water, and the exterior coarse bark is carefully scrubbed off by means of a dull edged knife. The scrubbed fibres are now dried in the shade hanging them one by one, on poles or ropes. When they are almost dried, they are arranged on the roof of the house exposed to the sun and dew for about a week, during which time the fibre becomes snow white and gets a beautiful lustre.

The Banana plants are only grown in Okinawa prefecture for the purpose of trade though they are widely distributed in the districts in the temperate zone where they are planted for ornamenting gardens only, accordingly, the annual produce of the fibre is not so great. The fibre is white in colour and coarse in feeling. It is woven into cloth known by the name of "Bashōfu" which is highly esteemed for under shirts for summer as it is lighter by about  $\frac{3}{4}$  to  $\frac{2}{3}$  of the weight of hemp and flax, and for not sticking to the skin when perspiring.

It is highly esteemed as a substitute for wall paper.

Products annexed:—Yechigo chijimi (*a*) and Okinawa jyōfu (*b*) are used for summer dresses of the higher class of Japanese. Bashōfu (*c*) is not used for cloth but for ornamental bordering of "Kakemono," and in place of wall paper &c. The value of this product in the year 1892 is as follows:—

Yechigo chijimi.	8.50 Yen per Tan.
Okinawa jyōfu.	3.00 „
Bashōfu.	1.75 „

**XX. PAPAR MULBERRY BARK** (*BROUSSONETIA  
PAPYRIFERA*).

KŌZO.

No. 60. Raw bark.

No. 61. Bleached bark.

The above two specimens are the produce of Tsubodami-mura, Mugi-gun, Gifu prefecture.

No. 62. Pulp made of paper mulberry.

**XXI. MITSUMATA BARK** (*EDGEWORTHIA PAPYRIFERA*).

No. 63. Raw bark.

No. 64. Bleached bark.

The above two specimens are produced in Mutsuai-mura, Minami-koma-gun, Yamanashi prefecture.

No. 65. Pulp made of Mitsumata.

**XXII. GANPI BARK** (*WICKSTREEMIA CANESCENS*).

No. 66. Raw bark.

No. 67. Bleached bark.

The above two specimens are produced in Irokawa-mura, Higashi-muro-gun, Wakayama prefecture.

No. 68. Pulp made of Ganpi.

**PRODUCTION OF PAPER MULBERRY, MITSUMATA,  
AND GANPI FIBRE.**

In addition to the above, the products of their fibres are shown. They are :—

(a) Letter paper and envelopes (外 No. 13).

(b) Ganpi paper (外 No. 27).

(c) Sukikomi paper (外 No. 49).

(d) Ink Ōyōshi (paper for pen writing. 外 No. 54).

(e) Yakuseishi (for writing and printing. 外 No. 55).



(f) Paper mulberry paper (外 No. 70).

(g) Gaikōshi (外 No. 75).

The above seven specimens are manufactured by Yedogawa-Seishi-gaisha, Tōkiō,

(h) Dzugashi (drawing paper No. 4).

(i) Tengujiyō (No. 7).

(j) Torinokogami (No. 10).

The above three specimens are produced by Mr. Hattori Gensaburō, Tōkiō.

(k) Wrapping paper, bleached.

(l) Wrapping paper, unbleached.

(m) Mitsumata pulp (in form of thick sheet).

The above three specimens are prepared by Fuji Seiski-gaisha, Tōkiō.

(n)	Wall paper	No. 1.
(o)	„ „	„ 2.
(p)	„ „	„ 3.
(q)	„ „	„ 4.
(r)	„ „	„ 5.
(s)	„ „	„ 6.
(t)	„ „	„ 7.

The above seven wall papers shown are made by Nippon-Kabegami-kaisha, Tōkiō.

The fibres of the Paper mulberry, Mitsumata, and Ganpi are the main raw material for paper making, the last being valued especially for producing the smooth, fine, and high lusted paper. However, Japanese paper is usually made of two or more raw materials and is very seldom prepared from a single material. Moreover, the fibres of Ganpi and Mitsumata are not strong enough singly, yet they are extensively used with other coarse raw materials in order to give the tenderness, smoothness, and lustre to paper of low quality.

The following table shows the yeild of the raw bark of paper

mulberry, Mitsumata, and Ganpi during the seven years since 1878:—

Years.	Total Produce in Kilograms.		
	Paper Mulberry.	Mitsumata.	Ganpi.
1878	13,899,414	1,486,395	24,211
1879	20,109,571	—	—
1880	18,568,432	—	—
1881	23,254,173	—	—
1882	16,874,041	2,659,805	6,820
1883	18,380,289	3,538,372	30,143
1888	24,180,132	2,873,109	33,741

The local value of paper mulberry and Mitsumata bark both raw and refined, during the last five years is represented in the following table:—

Years.	Paper Mulberry. Value at Mugi-gun, Gifu Pref.		Mitsumata. Value at Minami Koma-gun, Yamanashi Pref.	
	Raw bark. 100 Kin (=60 Kilograms).	Refined bark. 100 Kin (=60 Kilograms).	Raw bark. 100 Kin (=60 Kilograms).	Refined bark. 100 Kin (=60 Kilograms).
1888	8.50 Yen.	17.50 Yen.	3.78 Yen.	8.00 Yen.
1889	9.00 "	18.00 "	2.82 "	7.20 "
1890	8.50 "	17.50 "	2.66 "	6.40 "
1891	6.00 "	14.00 "	2.27 "	6.08 "
1892	5.70 "	13.40 "	1.86 "	4.80 "

For the value of Ganpi bark there is no certain record for many years, and, therefore, the latest local price in Higashi-Muro-gun, Wakayama prefecture, is given:—

Value of refined Ganpi, per 100 Kin.

First quality	8.00 Yen
Medium "	6.40 "
Inferior "	5.60 "

The following brief notes give a sketch regarding the cultivation and method of preparing the bark of paper mulberry, Mitsumata, and Ganpi.

#### PAPER MULBERRY.

The topographical features fit for the plant is a sloping place facing south-east, so as to receive the full light of the sun and protected from high wind. The suitable soil is gravel loam, or vegetable mould or yellow loam with some gravel. The propagation is done either by planting divisions of old roots, layerings, cuttings, or seeds; but the most common method is the first mentioned. This is performed in March, digging off young shoots from the old stubble, which is well manured once in the previous winter and again early in the spring, and the land is hand hoed at the same time. The young shoots with some rootlets are cut to the length of about one foot and planted in rows of about 2½ ft. wide, at an interval of about 3 inches, leaving the top about 2 inches above the ground, manured with some liquid manure, and covered with straw to prevent burning by the sun. And when the buds come out at the beginning of June the covering of straw is taken off and watering is repeated several times according to need. Weak branches which come out in abundance are taken off leaving at last only one vigorous shoot. The young plants are carefully dug out after the leaves have fallen and planted temporarily in some place till the time for transplanting.

There is no particular preparation to be done on the land where they are to be planted besides digging holes to receive the young plants which are usually transplanted at any time from the end of November to the beginning of January, or beginning of February to the end of March.

At the time of transplanting, the holes previously dug are partly filled with farm yard manure or with some oil cake, covered slightly with earth, over which the seed plants are set one by one, the remaining open part of the holes is filled up with earth

lightly trodden in round the plants. The seed plants required for an acre vary very much ; but usually range between 1,500-4,500.

Manures used after transplanting are commonly farm yard manure, grasses, tree-leaves, night soil, dried fish, &c. and they are given around the plants in spring. Weeding should be done many times, especially, in the first year and weak shoots pruned from time to time.

The yield from one acre varies according to the time of transplanting but the average of five years is, estimated at 300-600 kilograms of raw bark. As the plants are cut, they are steamed and the bark is stripped off before cooling, and dried by hanging on bamboo frames under the roof. The dried bark is now steeped in water and when softened rubbed violently in order to remove the exterior coarse and woody part which is again cleaned off by means of a small knife then well dried, and is now ready for market.

#### MITSUMATA.

Soil fit for the Mitsumata plant is nearly same as that for the paper mulberry plant ; but the topographical conditions suitable shows quite a contrary result, the paper mulberry flourishing in exposed situations while the Mitsumata succeeds in shaded places but free from stagnant water, and consequently, the best situation for the Mitsumata culture is the slope of mountains or hill sides, the soil gravel loam, belonging to the geological formation of paleozoic or mesozoic.

It can be propagated either by seed, layering, or by cuttings ; but the most extensive and practical method is raising plants from the seed. The seed is sown between the rows of barley or wheat or any other places where they are not exposed to sunlight. When the land is poor in nature some liquid manure is given to the rows before the seed is sown.

In March of the next year, the young plants are dug out and transplanted at the rate of 5,000 per Tan on hilly place or

6,000 per Tan on plain land. In planting out it is considered that a close plantation is rather better than an open one. Ploughing should be done two or three times during a year, manuring at the same time either with Chochin-cake (byproduct of rice spirit brewery), oil cake, or rice bran, or sometimes with green manure.

They yield the first produce in the second year and afterward, in every other year. It is harvested during the time, from November to March of the next spring, the yield commonly ranging at about 300 kilograms per acre, though there are some cases which gave over 1,000 kilograms of raw bark. The process of bleaching is quite the same with that of the paper mulberry bark.

#### GANPI.

This plant is very rarely cultivated, mostly the bark being gathered from that of a wild growth. Soil fit for the plants is clay of red or yellow colour in an exposed situation, such as a mountain or hillside facing south. Seed is sown at the end of March or beginning of April and covered slightly with earth. After they are germinated, weeding should be performed, manuring with some liquid manure and drawing the earth around the plant. In the dry summer of the first year, litters from horse stables or cows are spread around the plant and watering is repeated as required. In the succeeding years, hoeing and weeding are done during the summer, weeds being collected around the plant and let to decay there.

Harvesting time varies, according to various circumstances, from the third to the seventh year from the time of sowing. It is harvested by pulling out instead of cutting and then, new shoots come up from the old roots left in the ground and moreover seed dropped germinates naturally and they do not want to be transplanted again. The produce from one acre of land is estimated at about 500 or at most 700 kilograms of the raw

bark. The bark is at once stripped on the farm ; for if the stems become dry, the fibres are difficult to get and scraping the coarse outer bark, should be done whilst the stems contain some moisture. In performing the latter operation, the raw bark is steeped in water and scraped carefully with a knife and then, washed thoroughly with water to free it from the adhering matters and dried perfectly well by hanging on bamboo poles.

The use and value of their products :—The products of the above three fibres exhibited are as follows :—

- ( a ) Letter paper and envelopes, @ 1 “ Yen” per case, each containing 100 sets.
- ( b ) Ganpi paper, for tracing, @ 3 “ Yen” per ream.
- ( c ) Sukikomi paper, a substitute for napkins @ 80 “ Sen” per 100 sheets.
- ( d ) Inki Ōyōshi, for account-books &c., @ 47.5 “ Sen” per 100 sheets.
- ( e ) Yakuseishi, for printing books, letter paper, &c., @ 19.2 “ Sen” per 48 sheets.
- ( f ) Paper mulberry paper, for printing purposes, @ 33.6 “ Sen” per 48 sheets.
- ( g ) Gaikōshi, for bills or printing books, @ 2.35 “ Yen” per ream.
- ( h ) Dzugashi, for drawings, photograph, or lithographic purposes, @ 1.62 “ Yen” per 50 sheets.
- ( i ) Tengujiyō for papering window glass used instead of ground glass, @ 0.81 “ Yen” per 50 sheets.
- ( j ) Torinoko paper for picture printing, @ 22.50 “ Yen ” per 500 sheets.
- ( k ) Wrapping paper, whitened, @ 22 “ Sen” per lb.
- ( l )        “        “        , unwhitened, @ 20 “ Sen”   ,   ,
- ( m ) Wall paper, No. 1, @ 8. Yen per roll (36 × 3 Shaku).
- ( n )        “        “        No. 2.   , 7.70   “   “   “        “
- ( o )        “        “        No. 3.   , 7.20   “   “   “        “
- ( p )        “        “        No. 4.   , 6.70   “   “   “        “

(*q*) Wall paper, No. 5. @ 6.00 Yen per roll (36 × 3 Shaku).

(*r*) „ „ No. 6. „ 7.50 „ „ „ „

(*s*) „ „ No. 7. „ 6.40 „ „ „ „

The above specimens from (*m*) to (*s*) are prepared for papering walls &c. for which purpose they are noted for their elegance and beauty as well as their durability.

Export :—Japanese papers are known abroad for their great flexibleness and strength, which qualities are not excelled by any papers of other nations, and owing to their superiority the exportation is increasing year by year. The statistical export returns for the three years, since 1889, are as follows :—

For 1889.

Sorts. Ports.	Wall Paper.	Ganpi.	Miscellan'us.
	Value in Yen.	Value in Yen.	Value in Yen.
England.. ...	52,761	17,404	7,334
United States A. ...	12,632	4,019	10,797
Hongkong ... ..	—	—	19,933
Australia ... ..	6,795	—	—
France ... ..	—	14,422	—
China ... ..	—	2,201	54,945
Other ports ... ..	1,524	1,030	7,806
Total ... ..	73,712	39,076	100,815

For 1890,

England... ..	79,082	11,543	14,700
United States A. ...	15,503	12,604	10,588
Hongkong ... ..	1,944	—	13,588
Canada & B'sh A. ..	970	—	—
Australia.. ... ..	3,053	—	—
France ... ..	—	5,218	—
China ... ..	—	1,547	64,326
Corea ... ..	—	—	3,094
Various ports.. ...	1,109	3,361	8,608
Total ... ..	101,661	34,276	114,904

For 1891.

England .. ...	51,142	16,645	12,257
United States A....	14,631	15,329	15,514
Hongkong ... ..	3,828	—	14,209
Canada & B'sh A....	3,043	—	—
Australia.. ...	1,168	—	—
France ... ..	—	14,962	—
China ... ..	—	3,005	58,037
Corea ... ..	—	—	4,322
Various ports ...	1,116	1,998	8,470
Total. ... ..	74,928	51,939	112,809

### XXIII. SNAKE GUORD (*LUFFA PETOLA*).

#### HECHIMA.

No. 69. Snake guord.

The snake guord is cultivated to a more or less extent in nearly every part of Japan. There are two distinct varieties of “Hechima” or *Luffa Petola* in common cultivation ; one of which is long and slender in form and exclusively used as an article of food, and the other is long and plump from which the fibres of commerce are obtained.

The specimens of snake guord fibres, here exhibited are the production of the districts of Minami Katsushika-gun in the province of Musashi.

Uses:—The fibre is used for various purposes, for example, such as the heart of hats, the sole of socks or “Tabi,” for stuffing saddles, and in the place of sponge for washing, etc.

The market price of the snake guord fibres at Yokohama, in each year from 1888 to 1892 is shown in the following table.



Year.	Length over 1.25 Shaku.	Length over 1.18 Shaku under 1.25 Shaku	Length over 0.9 Shaku under 1.1 Shaku.
	Sen.	Sen.	Sen.
1888	2.0	1.2	0.6
1889	2.0	1.5	0.6
1890	2.8	1.7	1.0
1891	2.0	1.2	0.6
1892	2.7	1.8	0.8

The fibre is mostly exported from Yokohama, and some from the ports of Kōbe and Nagasaki; and the principal destinations of exportation are London, Havre, Hamburg, San Fransisco, New York, Shanghai and Hongkong.

The following table shows the quantity and value of snake guord fibre exported from Yokohama to foreign countries in each year from 1887 to 1891.

Year.	Quantities in Number.	Value in Yen.
1887	1,320,929	10,831
1888	1,392,535	8,393
1889	735,220	10,512
1890	1,192,687	16,541
1891	793,930	10,018

Cultivation :—The seed is sown in a seed bed in the month of March, and when the young plants bear four or five leaves they are transplanted in well cultivated fields—distance between the plants being about 1.2 Shaku, in rows of 2.8 Shaku apart—furnished with horizontal net work of bamboo or poles at the height of 4 or 5 Shaku from the ground, to which the vines of the plants twine up and spread all over, and thereby the fruit hanging down on vines get a proper shape. A suitable number of fruit for one plant to grow is from 4 to 5, and the average produce per acre is 24,000 in number. The gathering of the fruit generally speaking, takes place at the end of September.

#### XXIV. RUSH (*JUNCUS COMMUNIS*).

##### BINGO-I.

No. 70. Rush “Bingo-i,” produce of Okayama prefecture.

No. 71. Rush “Ringo-i,” produce of Fukuoka prefecture.

#### XXV. RUSH (*CYPERUS UNTIANS*).

##### SHICHITŌ-I.

No. 72. Rush “Shichitō-i” produce of Ōita prefecture.

Bingo-i and Shichitō-i are both among the most important articles of our household as “Tatami” and “Mushiro” (mats) which are indispensable to be laid down on the floors of all classes of Japanese houses, are woven of one or other of these rushes. The mats or “Tatami-omote” made of “Bingo-i” being handsome are mostly used by the higher classes while those made of “Shichitō-i” being somewhat rough in quality are only used by the lower class of people and also for wrapping cargoes etc. Pith of “Bingo-i” is extensively used for lamp wick.

Recently various kinds of fancy mats are made of two of these kinds of rushes and largely exported to foreign countries. The total value of the export of mats during the year (1891) amounted to 650,000 Yen and still there is every prospect of increasing this trade in future.

“Bingo-i” is chiefly produced at Okayama and Hiroshima prefectures, and “Shichitō-i” at Ōita. We are unable to give the amount of their produce, as no statistics was ever made but considering the fact that there is so large a demand for various kinds of mats both at home and abroad, shows that the amount produced is by no means small.

Cultivation of Bingo-i:—The soil best suited for growing Bingo-i is of a clayey character containing a small proportion

of gravel and resting upon a rather hard subsoil. The plants sprung out from the stubble cut in the previous summer, are rooted out and dipped in a dilute urine for 24 hours, and then divided into bundles of about ten such shoots which are transplanted in well prepared and manured land in the same manner as rice plants are transplanted in the paddy field. The distance from one bundle of the plants transplanted to another is about 4 Sun that is to say, a bundle of ten plants occupies 4 Sun square of ground. The time of transplanting usually takes place in the month of October or November but in the warmer districts it may be as late as the beginning of January. After the transplantation, the land is constantly watered as in rice fields and ordures and well rotten farm yard manures are applied several times at due intervals, especially, taking care to keep the land free from weeds.

In the middle of July, when fine settled weather is anticipated the rushes are harvested by reaping them with a sharp sickle, and they are immediately immersed in muddy water specially prepared in a small pond, by stirring in white clay, and then dried by spreading on grass land. The object of dipping the rushes into turbid water is to facilitate the drying by the effect of the adhering clay, and at the same time to protect "Bingo-i" from other noxious dusts. The most important point for harvesting Bingo-i is to pay great attention to the condition of the weather and in that time, for it is necessary in obtaining a superior quality, to dry the reaped rushes as quickly as possible, not exceeding more than 2 days, otherwise they depreciate greatly in quality and value.

The average yield of "Bingo-i" is about 250 Kwamme per Tan.

Cultivation of Shichitō-i:—This rush may be cultivated both in upland or "Hata" and rice field or "Ta." If it is grown in upland, soil of a moist nature is preferable, while in paddy field, too much superfluous water is undesirable.

Shichitō-i is propagated from roots, and for this purpose, the bundles of three or four plants separated from the mother stubbles are transplanted in well cultivated and manured nursery ground, in rows of 5 Sun or 6 inches apart at a distance of same length between the bundles. The plants raised in 20 "Tsubo" of such nursery ground are sufficient for transplanting in a "Tan" of the field.

For transplanting "Shichito-i" in the paddy field or "Ta" the land is deeply cultivated soon after the harvesting of rape or wheat crops, and well pulverized and manured with rape cake or "Shōchū-kasu," which quantity depends greatly upon the character of soil, and then the land is irrigated. Two or three root-plants together are transplanted in the rows of 5 Sun apart at a distance of 3 Sun between the plants. Ten days after the transplantation the water is withheld and the land is dried to a certain degree, and weeds are eradicated cleanly, and again the land is watered. These processes of drying, weeding, and watering the land are repeated two or three times during the summer months, and the second manuring is also given in the month of July.

Shichitō-i is ready for harvesting at 80 to 100 days after transplantation, in fact, the reaping of the plants takes place from the end of August to the middle of September. For harvesting the rushes the weather must be very fine. When the rushes are repeated, they are torn lengthwise into two parts with special tools and dried on sandy ground or grass land.

The average produce per "Tan" is 120 to 250 Kwamme.

### PRODUCTION OF BINGO-I AND SHICHITŌ-I.

The following are the specimens of mats made of "Bingo-i" and "Shichitō-i."

(a) Kinkwanyen, manufactured at Okayama.

(b) " " " "

(c)	1st quality, Aya-mushiro, manufactured at Bittiū.			
(d)	2nd „ „ „ „ „			
(e)	Damask, Aya-mushiro, „ „ „			
(f)	Common Aya-mushiro, „ „ „			
(g)	1st. quality, Somewake-mushiro, „ „ Bingo.			
(h)	Common Somewake-mushiro, „ „ „			
(i)	Damask Hana-mushiro, „ „ „			
(j)	Common Hana-mushiro, „ „ „			
(k)	„ „ „ „ „			
(l)	Kikaiori Hana-mushiro, „ „ Bungo.			
(m)	Damask Hana-mushiro, „ „ „			
(n)	Common Hana-mushiro, „ „ „			
(o)	„ „ „ „ „			
(p)	Seidaka Hana-mushiro, „ „ „			
(q)	Ordinary Hana-mushiro (best quality), „ Chikugo.			
(r)	„ „ „ „ „			

Of above 18 specimens\* of mats, (a) and (b) are woven with the best quality of Bingo-i (No. 70), those from (c) to (k) with fair quality of Bingo-i, (l) to (p) with “Shichitō-i” and (q) and (r) with “Bingo-i” of (No. 71).

The prices of above mentioned 18 varieties of mats at Kōbe during the year 1892 are shown in the following table.

Specimens.	Per Roll of 40 yards by 1 Yard Wide.	in Yen.
(a)	1st quality, Aya-mushiro, Okayama.	20.00
(b)	„ „ „ „	25.00
(c)	1st quality, Aya-mushiro, Bittiū.	13.50
(d)	2nd quality, Aya-mushiro, „	12.50
(e)	Damask Aya-mushiro, „	12.00
(f)	Common Aya-mushiro, „	9.50
(g)	1st quality Somewake Hana-mushiro, Bingo.	8.20
(h)	Common Somewake Hana-mushiro, „	5.80
(i)	Damask Hana-mushiro, „	6.80

\* These specimens of mats were collected by Messrs. Shimidzu & Co., the export marchant at Kōbe.

(j)	Common Hana-mushiro,	Bingo.	5.20
(k)	" " "	"	5.20
(l)	Kikaiori Hana-mushiro,	"	9.50
(m)	Damask Hana-mushiro,	"	7.00
(n)	Common Hana-mushiro,	"	5.30
(o)	" " "	"	5.30
(p)	Seidaka Hana-mushiro,	"	4.20
(q)	1st class, ordinary Hanamushiro, Chikugo.		6.50
(r)	" " " " "		6.50

The largest importer of these mats is United States of America, and England, Austria and Germany follow one after another. The following table shows the state of foreign tradet in mats from 1887 to 1891.

Destination Exported.	1887. Value in Yen.	1888. Value in Yen.	1889. Value in Yen.	1890. Value in Yen.	1891. Value in Yen.
U. S. A. ....	28,915	123,351	116,595	290,565	595,936
England ...	3,462	12,175	14,398	18,216	19,767
Hongkong ...	—	—	—	2,828	11,816
China .....	555	6,585	7,356	—	—
Australia ...	216	1,686	7,893	20,835	7,516
Germany ...	80	602	6,936	5,610	5,635
Canada and British America.....	127	1,173	3,801	2,269	3,908
Other countries..	2,941	2,653	4,901	7,218	11,540
Total ... ..	36,296	148,224	166,883	347,541	656,123

## XXVI. TOBACCO (*NICOTIANA TABACUM VAR. MACROPHYLLUM*).

### TABAKO.

Tobacco leaves here exhibited are nine in numbers, and their names and localities where they are produced are as follows:—

No. 73. Hatano, produce of Hatano-mura, Ōsumi-gun,  
Kanagawa prefecture.

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† No export duty is imposed in Japan on this article.

- No. 74. Tate, produce of Kataoka-mura, Kataoka-gun, Gumma prefecture.
- No. 75. Shinden, produce of Higashiyama-shinden, Ōtori-gun, Ōsaka-fu.
- No. 76. Mihara, produce of Sunami-mura, Toyoda-gun, Hiroshima prefecture.
- No. 77. Ōhazama, produce of Kawame-mura, Hienuki-gun, Iwate prefecture.
- No. 78. Ōhazama (unstretched leaves known as Shibariha), produce of Kawame-mura, Hienuki-gun, Iwate prefecture.
- No. 79. Ōyamada, produce of Oyamada-mura, Nasu-gun, Tochigi prefecture.
- No. 80. Aso, produce of Kusagaya-mura, Aso-gun, Kumamoto prefecture.
- No. 81. Kokubu, produce of Kokubu-mura, Nishisoo-gun, Kagoshima prefecture.

Tobacco leaves of good quality fit for Japanese taste, are extensively produced in various districts; but those required at present for exportation are the leaves (No. 73—No. 80) here exhibited. No. 81, Kokubu is highly esteemed by Japanese for its pleasant taste and fragrant odour, so that it always occupies the first place in the market price. It has not been exported at present; yet, it is added in order to show the quality of the tobacco, much valued in Japan. We have still a great area of land suited for tobacco cultivation and consequently we are able to supply a larger quantity of leaves of any sort, if the demand increased from abroad.

The tobacco is produced in every prefecture throughout the Empire; but those prefectures which produce over 300,000 Kwamme (=1,125,000 kilograms) are four; viz., Okayama, Fukushima, Hiroshima, and Tokushima, and there are also eight prefectures which produce over 200,000 Kwamme (=750,000 kilograms).

The following figures show the total produce in four years:—

Years.	Quantities in Kilograms.
1883	21,124,669
1884	22,299,791
1885	—
1886	—
1887	22,756,583
1888	28,852,103

Value:—The following list gives the market value per 100 lbs. of good quality during the five years from 1888 to 1892 which is reported by the tobacco merchant Mr. Sajihei Tanaka:—

Years. Kind.	1888	1889	1890	1891	1892
Hatano... ..	12.50Yen	11.50Yen	11.00Yen	12.50Yen	15.00Yen
Tate ... ..	10.50 "	10.00 "	9.00 "	10.50 "	13.50 "
Shinden... ..	10.00 "	9.50 "	8.50 "	9.50 "	13.00 "
Mihara... ..	10.00 "	9.50 "	8.50 "	9.50 "	13.00 "
Oyamada ... ..	9.50 "	8.50 "	7.70 "	9.00 "	11.50 "

Remarks:—The trade in Shinden and Mihara tobacco is usually carried on in Ōsaka or Kōbe, Aso in Nagasaki, and all others in Yokohama. The value of Ohazama is usually the same with Ōyamada. Aso is less by one Yen. Kokubu which is not exported at present, is valued at 40 Yen in the Tōkiō market.

Export:—Tobacco has been exported for a long time, chiefly in the unprepared form and the quantities exported were much greater than the present years, the local value of them ranging over 200,000 Yen in the years 1872, 1873, 1874, 1877, 1880, 1881, and 1884 and specially in the year 1885 when it amounted to more than 380,000 Yen. The quantities, value, and ports of export during the last five years are shown in the subjoined tabular statement:—



Years.	To Great Britain.		To China.		To France.		To Various Ports.		Total.	
	Q'tities lb.	Value in Yen.	Q'tities lb.	Value in Yen.	Q'tities lb.	Value in Yen.	Q'tities lb.	Value in Yen.	Q'tities lb.	Value in Yen.
1887	786,037	65,389	10,823	674	...	...	52,332	4,344	849,192	74,407
1888	674,322	75,824	78,645	4,968	1,769	231	414	45	755,160	81,068
1889	1,937,342	187,587	17,041	988	2,910	257	2,495	318	1,959,788	189,150
1890	1,249,816	117,439	26,934	2,209	...	...	6,166	521	1,282,916	120,169
1891	1,010,043	87,121	...	...	...	...	9,380	1,054	1,019,423	88,175

Export duty.—0.2411 Yen per 100 lbs.

Cultivation:—It may differ widely, when treated in detail, in different prefectures and consequently here it is briefly described. Soil fit for the plant are loam or gravel loam of yellowish color. The nursery bed should be made in a warm place plowing and pulverizing finely at the end of December, mixing night soil or rape cake with the earth thoroughly. Seed is sown at the beginning of February, trampled upon by the feet, and covered thinly with straw. When the seed is germinated the covering of straw is taken off and sprinkling from time to time, with the water preserved after bathing. The young plants require about one hundred days to grow to about 5 or 6 inches high, when they are ready to be transplanted. The field is now to be prepared, digging holes in rows, putting the manure into them, slightly covering with earth, and over which the plants are transplanted at the rate of 16,000 to 20,000 per acre. About two weeks after transplantation, powdered rape cake or fish manure is given, weeding and moulding being performed at the same time. Picking insects is the most troublesome work from the first to the last and never should be neglected. It is usually done every other day and early in the morning while the dew is on the leaves. Just before the plants blossom, they are topped leaving the required number of leaves and from that time suckering is performed according to necessity. The leaves begin to mature about sixty or seventy days from the time of transplantation, the under most leaves presenting a light yellowish color. In some

prefectures the leaves are usually harvested four times as they ripen, naming them Doba, Nakaha, Honpa, and Tempa respectively. The gathered leaves are stoked a few hours in order to make them a little flexible by losing some of the water which they contain. Then they are hung under the roof of the house (by ropes of rice straw), or in the house, or in the drying room specially prepared, for the purpose.

In other prefectures, they are left until all leaves are matured, after cutting the two or four undermost leaves called Doba, and harvested at once by cutting the stem above the ground. The cut stems with leaves are hung and dried in the same way as in the case of the other process.

The drying process requires about forty or fifty days. When the leaf stalks became brittle and the color turned to the required degree, the leaves are moistened by sprinkling water upon them to prevent breaking and then stretched carefully by hand, sorted into Doba, Nakaha, Honpa, and Tempa when separately harvested, or into two kinds according to the quality when harvested at once with the stem.

They are made into small bundles, by tying about ten or fifteen leaves together at the stalk, packed, and ready for market.

## XXVII. SHIITAKE. (*LEPIOTA SHIITAKE*).

Shiitake is produced in almost all parts of Japan but most abundantly obtained in the prefectures of Shizuoka, Kagoshima, Ōita, Miyasaki and Wakayama.

China also produces this article but owing to its inferior quality they import our produce in great quantity.

There are three kinds of Shiitake, viz. spring crop or "Haruko," autumn crop or "Akiko," and winter crop or "Kanko," and according to the manner of drying, they are known in commerce by two names, one is called "Kiboshi" and the other "Yakiko."

The former is the best and only obtained when fine weather continues for a long time, and after maturing of dries itself on the trees where it has grown, on account of the dryness of air, without using artificial means, or it is taken off from the trees and dried by the sun, while the latter is obtained by taking it raw and drying by artificial heat and is the one which is most commonly met in the market.

The specimens of Shiitake exhibited are as follows:—

No. 82. Shiitake (Kiboshi) of first class quality.

No. 83. Shiitake „ 2nd class quality.

No. 84. Shiitake „ common quality.

No. 85. Shiitake (Yakiko), 2nd class quality.

The above three specimens of Kiboshi are the produce of Tsuchigoye-mura, Kimizawa-gun, in the prefecture of Shidzuoka.

The average chemical composition of Shiitake is shown in the following table, (the analyses performed at Agricultural University).

Water	13.80	In 100 parts of pure ash.	
In 100 parts of dry substance.		Potash	55.54
Crude protein	16.45	Soda	7.51
Fat	2.59	Lime	1.72
Crude fibre	15.77	Magnesia	6.17
N. free extract	61.55	Ferrie oxide	1.26
Ash	3.65	Phosphoric acid	19.18
		Sulphuric acid.	4.38
Total nitrogen	2.63	Silica	2.68
		Chlorine	1.74

The average market price of Shiitake in Yokohama for the last six years is shown in the following table.

Year.	Kiboshi per Picul.			Yakiko per Picul.		
	1st Q'lity	2nd Q'lity	3rd Q'lity	1st Q'lity	2nd Q'lity	3rd Q'lity
	Yen.	Yen.	Yen.	Yen.	Yen.	Yen.
1887	75.00	35.00	25.00	30.00	27.00	24.00
1888	55.00	30.00	26.00	30.00	23.00	20.00
1889	60.00	32.00	24.00	33.00	26.00	23.00
1890	60.00	38.00	33.00	42.00	37.00	30.00
1891	65.00	43.00	33.00	46.00	39.00	25.00
1892	75.00	49.00	33.00	59.00	45.00	33.00

This article has long been exported to foreign countries having, year after year, a gradual increase both in quantity and value. It is most largely exported to China and the export to other countries is but insignificant. The following tables show the yearly state of this trade\* from 1887 to 1891.

Destination of Export.	Quantity of Shiitake exported, in Kin.				
	1887	1888	1889	1890	1891
Hongkong ...	—	—	—	996,741	1,009,317
China .....	1,394,954	1,826,681	1,530,609	701,559	495,661
U. S. America	26,811	23,661	27,910	32,620	35,317
Other Cts. ...	837	1,025	3,935	5,115	8,952
Total .....	1,422,602	1,851,367	1,562,454	1,736,035	1,548,887

Destination of Export.	Value of Shiitake exported, in Yen.				
	1887	1888	1889	1890	1891
Hongkong ...	—	—	—	332,569	363,021
China .....	433,247	509,069	460,155	235,304	182,061
U. S. America	9,332	6,584	8,355	10,191	11,737
Other Cts. ...	219	277	1,153	1,696	3,034
Total .....	442,799	515,930	469,663	579,760	559,853

\* Export duty is levied on this article in Japan at the rate of 1.60 Yen per Picul or 100 Kin.

N. B. The figures in columns of 1887 and 1888 include besides Shiitake, some other kinds of dried fungi, but they are only very little in quantity and value, not exceeding one-tenth of those of Shiitake.

Shiitake grows in several trees belonging to the natural order Cupuliferæ such as *Quercus cuspidata*, *Q. dentata*, *Q. serrata*, *Q. Acuta*, etc. The method of growing Shiitake on such trees is as follows :—The trees of about 20 years old are cut down at the approach of winter and after the lapse of 20 or 30 days according to the condition of the drying of the wood, are sawn off into logs of 4 or 5 feet long, and to each of these logs incisions are made with a hatchet, at intervals of about 6 inches, and then they are piled regularly upon a frame furnished at a height of about one foot above the ground under the trees.

The position of the ground selected for piling the logs should be the slopes of a forest facing to the south-east or south-west.

After keeping the logs as above described for two years, they are dipped in water for 24 hours in the middle of November, and again laid one upon another for about four days and if it is a cold district the heap is covered with straw or mats, and then the logs rest upside down against poles fixed horizontally to the trees at a height of about 4 feet, in a well ventilated and sunny situation under the trees, when Shiitake begins to issue and after 20 or 30 days of its growth, it is ready for harvesting.

## XXVIII. MENTHOL CRYSTAL AND PEPPERMINT OIL.

### HAKKA-NŌ AND HAKKA-YU.

Pepper mint or *Mentha Arvensis* was cultivated from a very remote age in Japan in the north-eastern part of Japan.

The most famous districts for its large production are in the prefecture of Yamagata where there is an extensive tract of land suited for the cultivation of this plant; and nearly all menthol crystal and peppermint oil exported to foreign countries is supplied from there.

The following specimens of menthol crystal and peppermint oil exhibited are all the produce of Yamagata prefecture.

No. 86.\* Menthol crystal, refined.

No. 87. Menthol crystal, common.

No. 88. Peppermint oil, refined.

No. 89. Peppermint oil, common.

Although there is no accurate return of the amount produced it may be roughly estimated to be over 70,000 Kin including both menthol crystal and oil.

The annual market prices of menthol crystal and oil in Yokohama during the years 1887 to 1891 are shown in the following table:—

Year.	Menthol Crystal per Kin.		Peppermint Oil per Kin.	
	Common. Yen.	Refined. Yen.	Common. Yen.	Refined. Yen.
1887	2.70	3.35	1.70	2.10
1888	2.65	3.30	1.60	2.10
1889	2.50	3.20	1.60	2.10
1890	2.00	2.50	1.60	2.10
1891	2.00	2.50	1.50	2.00

The Quantity and value of the export\*\* in each year from 1887 to 1891 are shown in the following table :—

Year.	Menthol Crystal.		Peppermint Oil.	
	Quantity in Kin.	Value in Yen.	Quantity in Kin.	Value in Yen.
1887	16,931	49,659	28,079	39,655
1888	27,219	71,430	29,362	42,883
1889	18,221	30,754	36,894	46,310
1890	13,910	17,656	31,982	33,102
1891	22,369	25,618	86,423	76,528

\* These four kinds are sold by Mr. Nagaoka, at Yokohama.

\*\* No custom duty is imposed on this article.

They are most largely exported to England, and United States of America, Hongkong, Germany and France following in this order in quantity and value. As regards to the quality of menthol crystal exported to foreign countries No. 87 takes up nine-tenths of the total quantity and the remaining one-tenth is supplied by No. 86 which is exclusively exported to China.

Uses :—Besides being used extensively for various medical purposes, they are used as ingredients for making some kinds of confectionary and also for making tooth powder, a few drops of the oil or a few crystals of the menthol dropped on water is used for rinsing the mouth. It is also applied for counteracting nauseous smells in privies etc.

Cultivation :—For growing peppermint which is a perennial plant belonging to the natural order Labiatae, the land is well prepared in the month of October, and the roots separated from the stubble are cut to the length of about 3 Sun and planted in well prepared soil manured with rice bran, rape cake, sake-kasu, etc. in rows of 2 Shaku apart and distant about 1.5 Shaku between the plants. In the next spring a dilute ordure is given when the plants grow vigorously.

The first cutting of the plant is done in the middle of July, and the second in the middle of September, and sometimes, but rarely, a third cutting is made in some districts.

The plant reaped is dried under a shed without exposing to the sun and carefully kept for future distilling.

The best time for distilling is said to be the middle of January.

The average produce of dried leaves per “ Tan ” is 300 to 400 Kwamme, and one Kwamme of dried leaves yield about 8 Momme of “ Hakka.”

## XXIX. CHILLI (*CASPIUM LONGUM*).

### TŌGARASHI.

Chilli or “Tōgarashi” is cultivated to a more or less extent, in nearly all provinces of Japan.

The fresh unripe fruit and leaves of certain varieties are eaten by cooking them with soy, sugar, “Katsuwobushi,”\* etc., but generally speaking, they are either preserved in salt or made into powder after drying, and are used as spices.

When the dried fruit is placed between or inside of any thing valuable kept in boxes it protects them from insects.

The specimens of Chilli or Tōgarashi here exhibited are as follows :—

No. 90. Chilli, var. known as Takano-tsume Tōgarashi.

No. 91. Chilli, „ „ „ Yatsufusa Tōgarashi.

No. 92. Chilli, „ „ „ Naga Tōgarashi.

The above mentioned three varieties are the produce of Fukakusa-mura, Kii-gun, Kiōto-fu.

The variety, heretofore, exported to foreign countries is principally Takano-tsume; the following shows the annual quantity and value of the export from 1890-1892.

Year.	Quantity in Kin.	Value in Yen.
1890	180,000	6,500
1891	260,000	6,400
1892	80,000	3,500

The principal destinations of the export are Germany, England and India.

The Average market price of Chilli in Yokohama in the Year 1890-1892 in as follows:—

1890	3.78 Yen per 100 Kin.
1891	2.67 „ „ „ „
1892	4.34 „ „ „ „



Cultivation :— The seed is sown in seed beds and transplanted in well cultivated ground in the beginning of May at the rate of 8 or 10 young plants per “ Tsubo ” of land, and when the season is dry the land is manured with liquid manure so as to keep the soil not too dry. The time of harvesting commences from the beginning of September and lasts until the beginning of November. The product of fruit much depends upon the variety ; the variety like Takapo-tsumé yields about 18 Koku per Tan.

### XXX. GINGER (*ZINGIBER OFFICINALE*).

#### SHŌGA.

Ginger or the dried rhizoma of the *Zingiber Officinale* is known in commerce under two different names called “ Shyokiō ” and “ Kankiō ” according to the different methods applied in preparation.

The following specimens of dried ginger are exhibited.

No. 93. Shyokiō, from Nakagami-gun in Shidzuoka prefecture.

No. 94. Shyokiō, from Kita-Adachi-gun in Saitama prefecture.

No. 95. Shyokiō, from Kita-Adachi-gun in Saitama prefecture.

No. 96. Kankiō, from Nakagami-gun in Shidzuoka prefecture.

No. 97. Kankiō, from Kita-Adachi-gun in Saitama prefecture.

Ginger is cultivated throughout the Empire, but the chief sources of supply for exporting it, either in the raw state or as dried ginger are the prefectures of Shidzuoka and Saitama.

Cultivation :— In the beginning of May, the roots or rhizoma of ginger, hitherto carefully stored in under ground cellars are taken out in the beginning of May, and trans-

planted between rows of growing barley or wheat. The distance of rows of the cereals sown in Japan being generally about 2.1 Shaku or about 13 inches apart, the roots of ginger are planted at a distance of from 1 to 1.2 Shaku in the rows and manured with composts, of rape seed cakes, fish manures, etc.

The shoots of the plant grow rapidly after the harvest of the cereal crops which is usually preformed in the beginning of June, and the Ginger roots are fit to be gathered in the middle of November.

The average produce of an acre is estimated to be 13,780 lbs. of raw ginger or 1,655 lbs. of dried ginger or “Shyokiō” in the districts of Shidzuoka prefecture.

Preparation :— For preparing the dried ginger or Shyokiō in commerce, the rhizoma are washed, the epidermis scraped off and then cut into three slices, spread thinly on straw mats where lime is sprinkled thoroughly covering them with it, in order to insure a quick and proper drying, and then exposed to the sun, for from 20 to 30 days until the required dryness is attained. Shyokiō is also prepared by drying with lime without cutting into slices. The process of preparing Kankiō is for the most part, the same with that of Shyokiō above described, and the only difference of the treatment being the former is steamed before covering the rhizoma with lime.

Uses :— Ginger is extensively used as spice both in the fresh and dry states. It is largely appropriated for medical purposes. The rhizoma when procured fresh are pickled in vinegar or Mumedzu—an acid juice got in salting plums—and form a popular adjunct to various dishes. The rhizoma washed, scraped, cut into thin slices and preserved in sugar or syrup, form a very delicious preserve. They also form many kinds of very agreeable sweet meat and are used to some extent for flavouring certain kinds of beverages.

The average market price of dried ginger at Yokohama in each year from 1887 to 1891 is shown in the following table :—

Year.	Shyokiō, from Saitama-Ken Per Picul.	Shyokiō, from Shidzuoka-K. Per Picul.	Nankiō, from Saitama-Ken Per Picul.	Nankiō, from Shidzuoka-K'n Per Picul.
	Yen.	Yen.	Yen.	Yen.
1887	3.50	3.60	3.00	3.10
1888	3.50	3.70	3.00	3.10
1889	3.50	3.80	3.00	3.20
1890	3.80	4.00	3.30	3.50
1891	8.00	9.00	4.30	5.00

The following table shows the quantity and value of dried ginger, principally Shyokiō, exported in each year from 1887 to 1891.

Year.	Quantity in Kin.*	Value in Yen.
1887	248,481	7,606
1888	302,688	6,050
1889	448,961	9,260
1890	513,695	7,561
1891	905,362	14,881

The quantity of dried ginger exported to various foreign countries in each year from 1887 to 1891 is shown in the following table:—

Destination.	1887 Kin.	1888 Kin.	1889 Kin.	1890 Kin.	1891 Kin.
U. S. A. ....	—	3,186	—	—	—
Hongkong ...	—	—	22,161	5,499	63,345
France.....	550	7,342	—	—	—
England .....	117,938	12,546	8,026	14,296	67,719
China. ....	69,361	113,615	14,450	213,835	348,883
Corea. ....	16,841	68,540	282,424	251,679	330,623
British Am...	—	3,265	69,900	14,806	—
Germany .....	5,402	—	8,097	100	—
Australia. ...	74	—	—	—	—
British India.	—	—	28,690	1,210	61,520
Austria.....	10,676	10,448	—	—	—
Russia .....	11,246	13,062	15,213	12,270	33,273
East India. ...	16,392	188,020	—	—	—

\* Kin = Catty = 160 Momme = 0.601 Kilogramme.

### XXXI. PEPPER (*PIPER HANCEI*).

#### HIHATSU.

No. 98. Pepper (Hihatsu).

Hihatsu is a perennial plant belonging to the typical order *peperaceæ*, flowering and bearing fruit from the months of spring to autumn, in a subtropical climate. It was first introduced from China, in a very remote age, to the isles of Okinawa prefecture or Riū-kiu Isles and at present it grows wild at several places in those isles.

The common method of propagating this plant in Okinawa prefecture is that, the vines cut into lengths of a few inches and simply planted along the stone fences which usually surround the dwelling houses, when the plants root out from each knot after some rain and grow vigorously by climbing up the fences or twinning up trees. Neither manuring nor any further cultivation is necessary for growing this plant.

For gathering the fruit, there is no definite time for the plant flowers and bears fruit nearly all the year round except in winter as above described, but generally speaking, it takes place twice a year; the first in the beginning of summer and the second in the end of autumn.

When the fruit has nearly matured its hue becomes reddish; then it is gathered, steamed and dried in the shade. As it dries, it changes its colour to black, when it is roasted and powdered, and used as pepper.

The annual yield of Hihatsu in Okinawa prefecture is estimated to be about 1,300 Kin. Not a small amount of Hihatsu is exported to China. Its price per Kin is 10 Sen at Okinawa.

# XXXII. DRIED SWEET POTATO (*BTATAS EDULIS*).

## HOSHI-SATSUMAIMO.

No. 99. Dried sweet potato.

Sweet potato or “Satsumaimo” is cultivated in almost all parts of Japan excepting the north-eastern region and it is used as usual food by the people of Riu-kiu Isles and some parts of Kiūshū, while in all other places it is largely consumed as an intermediate food and cooked either by steaming or roasting. Women and children of every rank are especially very fond of it. Besides, being used as food it is used in various ways. It is made into starch and it is also dried and preserved as “dried sweet potato” a specimen of which is, here, exhibited.

The following table shows the chemical compositions of three varieties of fresh sweet potato (analyses performed at the Agricultural University Tōkiō).

	(a)	(b)	(c)
Water.	64.27	65.56	75.01
In 100 parts of dry matter.			
Crude protein.	4.12	5.40	5.70
Fat.	3.00	1.06	1.16
Crude fibre.	2.74	3.57	3.78
Starch.	78.59	67.77	81.27
Dextrin and glucose.	6.21	14.90	
Other N. free substances.	3.58	4.97	
Ash (free of C. and CO <sub>2</sub> )	1.75	2.30	8.09

*Note.*—(a) is a late variety with white flesh, (b) is also a late variety with yellow flesh, and (c) early variety with white flesh.

According to the return furnished in the year 1887 the total amount produced of the fresh sweet potato is estimated to be 561,407,587 Kwamme.

The price of dried sweet potato varies greatly according to the facility of conveyance from where it is produced. The . .

following is the price per bag of dried sweet potato at Haibara-gun in Shidzuoka prefecture where the specimen exhibited is produced.

Year.	1st Quality per bag of 9 Kwamme.	2nd Quality per bag of 7 Kwamme.	3rd Quality per bag of 6 Kwamme.
	Yen.	Yen.	Yen.
1888	0.85	0.58	0.45
1889	0.90	0.60	0.50
1890	0.90	0.60	0.48
1891	0.90	0.60	0.50
1892	1.00	0.65	0.55

For preparing the dried sweet potato, a certain quantity of cleanly washed potatoes are placed in a suitable basket and immersed in boiling water for a short time and when taken out of the basket, they are cut into thin slices and spread over mats and exposed to the sun for two or three days. In order to make a superior quality, the skin of the potatoes is peeled off before they are cut into slices.

### XXXIII. SWEET POTATO STARCH.

No. 100. Sweet potato starch.

The starch is prepared from the bulbs of *Batatas edulis* and its price is 2.10 Yen per 10 Kwamme in Tōkiō.

### XXXIV. DRIED DAIKON OR DRIED RADISH (*RAPHANUS SATIUS*).

#### KIRIBOSHI-DAIKON.

Daikon is one of the most important root crops in Japan, and is cultivated to more or less extent by nearly all farmers in every part of the Empire, and there are several varieties and subvarieties in cultivation.

It is eaten raw, boiled or pickled. It is also cut into thin

slices and dried for a provision called “Kiriboshi-daikon.” Three specimens of the Kiriboshi-daikon are, here, exhibited.

No. 101. Senkiriboshi, produce of Shimotsu-mura,  
Nakajima-gun, Aichi prefecture.

No. 102. Kaikokiriboshi, do.

No. 103. Wariboshi, produce of Shigo-mura, Naka-  
jima-gun, Aichi prefecture.

Although Daikon is produced in all districts of the Empire those produced at Aichi and Gifu prefectures where the Daikon is most abundantly grown are regarded as the best in quality.

The following is the chemical composition of fresh Daikon before it is prepared as Kiriboshi or dried Daikon (the analyses performed at The Agricultural University, Tōkiō).

	(a)	(b)
Water.	93.45	94.36
In 100 parts of dry matter.		
Crude protein.	13.39	21.69
Fat.	1.06	1.06
Crude fibre.	11.78	13.63
Starch, dextrin, glucose etc.	44.87	54.44
Other N. free substances.	22.28	
Ash.	6.62	9.18
Total nitrogen.	2.142	3.471

*Note.*—(a) is a very sweet variety, root cylindrical and (b) is a common autumn variety, root conical.

The prices of this produce at Nakajima-gun in the prefecture of Aichi in each year from 1888 to 1891 are shown in the following table:—

Year.	Senkiriboshi Per Picul.	Kaikokiriboshi Per Picul.	Wariboshi Per Picul.
	Yen.	Yen.	Yen.
1888	1.70	1.50	5.76
1889	2.00	1.76	6.80
1890	1.90	1.67	6.46
1891	1.20	1.06	4.08

For manufacturing “Senkiriboshi” and “Kaikokiriboshi” well washed Daikon is cut into fine strips say 5 Rin or  $\frac{1}{16}$  inch in thickness for the former, and 2 Bu or  $\frac{1}{4}$  inch for the latter with an instrument called “Shōjiki,” and then they are dried by exposing to the sun in the cold open air. To make “Wariboshi” an straight “Daikon” is selected and after peeling the skin, it is cut firstly up and down into panes of about 12 Rin or  $\frac{1}{8}$  inch thick ; then three or four of these panes are piled one upon another, and cut again vertically into fine strips leaving one or two Sun at one end and dried by hanging each piece to a stretched rope, and when sufficiently dried they are taken into the house, and after the lapse of 10-15 hours when they reabsorb a suitable degree of moisture, they are then twisted and cut into equal lengths.

### XXXV. KONJAK FLOUR.

#### KONNIAK-KO.

No. 104. Konjak flour.

Konjak flour is prepared from the dried bulbs of *Cono-phallus konjak*. It is largely used as an article of food and also employed for industrial purposes.

When preparing konjak flour for food, 1 “Sho” or 1.8 litre of the flour is well mixed with 40-45 litres of water, and about 100 cubic centimetres of caustic lime dissolved in about 3 litres of water is added to the gelatinous mixture and when the latter becomes a thick paste, it is poured into flat shallow wooden moulds, and boiled in water for about 10 minutes. During the



boiling the pasty mixture assumes a soft elastic consistency which is taken out and cooled, and forms what is called "Konniaku." For cooking, it is cut into small pieces and boiled with soy, soup, mirin, sugar etc.

The fresh bulb of konjak analyzed at The Agricultural University at Tōkiō gave the following percentage composition.

Water.	91.76
In 100 parts of dry matter.	
Crude protein.	12.50
Fat.	0.96
Fibre.	3.67
Nitrogen free extract.	78.43
Ash.	4.42

Konniaku sold in shops and ready for cooking contains the following composition (analyzed at The Sanitary Experiment Station).

Water.	96.15
Albuminous matter.	0.01
Fat.	—
Fibre.	0.26
Nitrogen free extract.	3.10
Ash.	0.48

For industrial purposes it is used as an excellent sizing, rich in fine lustre, and when the paste made of the flour is brushed on Japanese paper, it forms a leather-like substance giving it both water and air-tight qualities.

The following specimens here exhibited are made of Japanese paper smeared with konjak paste.

- (a) Konjak paper.
- (b) Imitated bladder.
- (c) Pillow made of konjak paper.
- (d) Cushion „ „ „ „

For preparing konjak paste, for making above mentioned

specimens 1 part of flour is well mixed with 10 parts of water and heated.

For manufacturing konjak flour, after the outer skin of the bulb is cleaned off, it is cut into thin pieces of about  $\frac{1}{16}$  inch, dried for about seven days by exposing them to the sun; and then powdered by pounding in a mortar by means of a water mill, specially constructed so as to fan off the lighter parts of the powder, leaving only the heavier portion.

One hundred Kwamme of good fresh bulbs produces about seventeen Kwamme of flour of the best quality.

The average market price of konjak powder per 45 Kwamme in Tōkiō in the year 1891-1892 is as follows :—

	First Quality.	Second Quality.	Third Quality.
1891	46.41 Yen	44.83 Yen	42.91 Yen
1892	39.60 „	38.50 „	37.40 „

For cultivating konjak land well drained and sloping is selected. At the end of April or in the beginning of May the seed bulb is planted at the rate of 180-190 Kwamme per Tan and at the same time farm yard manure, rice bran etc., are applied and the land is covered with straw or grasses.

The time of harvesting the bulb is in the middle of October or the beginning of November of the third year after planting when some bulbs weigh more than 3 Kin. The average produce per Tan is 1,000 Kwamme.

### XXXVI. KAMPIŌ (*LAGENARIA VULGARIS*).

#### No. 105. Kampiō.

Kampiō is the stripped and dried flesh of the fruit of a kind of guord, called “Yugawo” *Lagenaria Vulgaris*. It is used as an article of food by boiling with water, soy, sugar, mirin etc. It can be preserved for a long period, if kept in proper vessels and closed tightly. The Analysis of “Kampiō” made

by The Sanitary Experimental Laboratory gave the following result.

Water.	20.39
Crude protein.	8.32
Fat.	1.54
Glucose.	20.08
Dextrin.	15.41
Starch and other N. Free Ext.	18.69
Crude fibre.	10.69
Ash.	4.92

Kampiō is cultivated in nearly all parts of Japan, but the most famous districts for its production are in the province of Shimotsuke.

There is no accurate return of the amount produced, but it is roughly estimated to be more than 400,000 Kwamme or 1,500,000 Kilograms.

The market price of "Kampiō" fluctuates more or less according to the fertility or unfertility of the year; the average of the last 10 years in the town of Tochigi, the most celebrated place for its abundant produce and good quality, was 5 Yen per 10 Kwamme. In the cheapest time, the price comes down as low as 4.3 Yen, while sometimes it reaches as much as 7 Yen per 10 Kwamme.

Kampiō is exclusively exported to China.

Cultivation:—The seed is sown in a hot seed bed in the beginning of April and transplanted in well prepared and highly manured ground in the beginning of May and harvested in the month of July. The common manures used for its cultivation are fish manure, rice bran, rape seed cake, composts and farm yard manures.

## XXXVII. WINE.

No. 106. Wine.

It was very recently that wine making was introduced

into Japan, so that the quantity of wine produced is not a large amount.

The specimens of wine here exhibited are of two kinds and both of them are made and sold by Mr. Miyazaki Mitsutaro of Iwai-mura, Higashi Yatsushiro-gun in Yamanashi prefecture.

(a) White wine.

(b) Red wine.

Of above two specimens, the white wine is made from the variety of grapes called "Kōshu-budo," indigenous to Japan and used especially for medical purposes, while the red wine is made of the varieties of grapes introduced from France and employed for table use.

The percentage of the chemical composition of above two kinds of wine analyzed by Dr. N. Nagai is shown in the following table.

	White Wine.	Red Wine.
Specific gravity.	0.995	0.995
Alcohol.	9.850	9.850
Extract matters.	2.940	2.240
Grape sugar.	1.726	1.150
Tartaric acid.	0.392	0.424
Volatile acid.	0.272	0.286
Glycerine.	0.329	0.420
Ash.	0.136	0.140



The price of above two kinds of wine is 3.50 Yen each per dozen flasks in Tōkiō.











# DETAILS

OF THE

## INDUSTRIAL SPECIMENS

BY

The Bureau of Commerce and Industry,  
Department of Agriculture and  
Commerce, Japan.



PRINTED BY M. ŌNUKI, TOKYO.

1893.







**DETAILS**  
OF THE  
**INDUSTRIAL SPECIMENS**  
EXPOSED AT  
**THE WORLD'S COLUMBIAN EXPOSITION**

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The Bureau of Commerce and Industry,  
Department of Agriculture and  
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— 6 —  
1893.



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# DETAILS

## OF THE

# INDUSTRIAL SPECIMENS.

### SPECIMENS OF ENVELOPES, NOTE-PAPER AND FOLDED PAPER.

(H. Department, Group 89, Class 560.)

The envelopes and note-papers should be of strong nature, the papers manufactured at the Imperial Printing Bureau are strong and best suited for export purposes. The drawings and figures impressed upon them are in the newest style, much appreciated by the customers. The following arrangement will show that they are done by the noted painters.

Folded-papers are used in ceremonies and in sending presents from time immemorial. The different varieties are much more than shown here. In the present days, they are used in wrapping small articles and the way in which they are used in wrapping small articles and the way in which they are used is quite many.

TABLE OF ENVELOPES AND NOTE-PAPERS.

SYMBOL.	NUMBER.	VALUE OF ONE THOUSAND LEAVES.	SYMBOL.	NUMBER.	VALUE OF ONE THOUSAND LEAVES.
A	From No. 1 to No. 6	Yen. 8.25	M	From No. 1 to No. 6	4.400
B	„ No. 1 „ No. 7	9.35	N	„ No. 1 „ No. 6	5.500
C	„ No. 1 „ No. 7	8.25	O	„ No. 1 „ No. 6	7.700
D	„ No. 1 „ No. 6	9.35	P	„ No. 1 „ No. 7	8.250
E	„ No. 1 „ No. 8	8.80	Q	„ No. 1 „ No. 5	6.600
F	„ No. 1 „ No. 6	8.25	R	„ No. 1 „ No. 5	7.150
G	„ No. 1 „ No. 6	5.15	S	„ No. 1 „ No. 5	6.050
H	„ No. 1 „ No. 4	6.05	T	„ No. 1 „ No. 5	6.600
I	„ No. 1 „ No. 6	6.05	U	„ No. 1 „ No. 5	4.950
J	„ No. 1 „ No. 5	12.50	V	„ No. 1 „ No. 5	5.500
K	„ No. 1 „ No. 6	5.50	W	„ No. 1 „ No. 5	10.450
L	„ No. 1 „ No. 6	6.60	X	„ No. 1 „ No. 5	11.000

TABLE OF THE FOLDINGS.

NUMBER.	NAMES.	VALUE ON EACH 100 LEAVES.
1	Genjō Mochi Fold.. .. .	Yen. 4.000
2	Hōzuki Fold .. .. .	4.000
3	Genjō Mochi Fold.. .. .	4.000
4	Heishi Mechō .. .. .	4.000
5	Incense Spoon, and Tong Fold .. .. .	4.000
6	Salt Fold .. .. .	4.000
7	Fan Fold .. .. .	4.000
8	Scummai Fold .. .. .	3.000
9	Incense fold .. .. .	3.000
10	Kaorimono Fold .. .. .	3.000
11	Incense Label Fold .. .. .	4.000
12	Hawk Bill Fold .. .. .	4.000
13	Incense Fold .. .. .	4.000
14	Heishi Ochō .. .. .	4.000
15	Incense Fold .. .. .	4.000
16	Incense Spoon, and Tong Fold .. .. .	4.000
17	Floval Fold.. .. .	4.000
18	Gold Fold .. .. .	3.000
19	Coloured Papar Fold .. .. .	4.000
20	Genjō Mochi Fold.. .. .	4.000
21	Hōzuki Fold .. .. .	4.000
22	Incense Fold .. .. .	3.000

COLLECTION OF NASHIJI.

(H. Department, Group 90, Class 567.)

Nashiji is the name given to one kind of gold lacquerings, principally applied to the inner side of boxes and under side of tables. There are many varieties and the difference in price is also great. At one sight the appearance being almost alike, and in transaction it is sometimes indiscriminately dealt with, causing disadvantages to both sides. Here the class and price are minutely shown.

TABLE OF THE VALUE AND VARIETIES OF NASHIJI.

[From No. 1 to 29 is gold, from 20 to 42 is silver, and from 43 to Upward is tin.]

No.	NAMES.	VALUE (each 1 Sun sq)	
		Yen.	
1	Yakikin Gyōbu Nashiji .. .. .	0.4600	
2	Yakikin Daiichi Nashiji .. .. .	0.1287	
3	Yakikin Daini Nashiji .. .. .	0.1287	
4	Yakikin Daisan Nashiji .. .. .	0.1178	
5	Yakikin Kanoko Nashiji .. .. .	0.1560	
6	Yakikin Tamamura Nashiji .. .. .	0.0850	
7	Yakikin Kumo Nashiji .. .. .	0.0850	
8	Yakikin Kasumi Nashiji .. .. .	0.0850	
9	Yakikin Kirihaku Moyōiri Nashiji .. .. .	0.3705	
10	Yakikin Tsune no san Nashiji .. .. .	0.2106	
11	Yakikin Daisan no chū Nashiji .. .. .	0.0632	
12	Yakikin Shōsan no chū Nashiji .. .. .	0.0577	
13	Yakikin Daini Hirame Nashiji .. .. .	0.2680	
14	Yakikin Daidai ichi Okihirame Nashiji .. .. .	0.7528	
15	Yakikin Tsunenosan Makihirame Nashiji .. .. .	0.6276	
16	Yakikin Daisan Okihirame Nashiji .. .. .	0.7631	
17	Yakikin Shōsan Makihirame Nashiji .. .. .	0.5174	
18	Kobankin Tsune no san Nashiji .. .. .	0.5460	
19	Kobankin Shōsan Nashiji .. .. .	0.4120	
20	Kobankin Gyōbu Nashiji .. .. .	0.3900	
21	Kobankin Daiichi Nashiji .. .. .	0.1025	
22	Kobankin Daini Nashiji .. .. .	0.1027	
23	Kobankin Daisan Dzume Nashiji .. .. .	0.0975	
24	Kobankin Kumo Nashiji .. .. .	0.0715	
25	Kobankin Tamamura Nashiji .. .. .	0.0715	
26	Kobankin Kasumi Nashiji .. .. .	0.0715	
27	Kobankin Daisan no chū Nashiji .. .. .	0.0559	
28	Kobankin Shōsan no chū Nashiji .. .. .	0.0507	
29	Gin Gyōbu Nashiji .. .. .	0.1105	
30	Gin Daiichi Okihirame Nashiji .. .. .	0.1430	
31	Gin Daisan Okihirame Nashiji .. .. .	0.2015	
32	Gin Daini Okihirame Nashiji .. .. .	0.0877	
33	Gin Daisan Makihirame Nashiji .. .. .	0.0585	
34	Gin Tsune no san Makihirame Nashiji .. .. .	0.0585	
35	Gin Shōsan Makihirame Nashiji .. .. .	0.0520	
36	Gin Kanoko Nashiji .. .. .	0.0936	
37	Gin Daisan Dzume Nashiji .. .. .	0.0260	
38	Gin Kumo Nashiji .. .. .	0.0240	
39	Gin Tamamura Nashiji .. .. .	0.0240	
40	Gin Kasumi Nashiji .. .. .	0.0210	
41	Gin Daisan no chū Nashiji .. .. .	0.0221	
42	Gin Shōsan no chū Nashiji .. .. .	0.0214	
43	Suzu Tsune Nashiji .. .. .	0.0071	
44	Suzu Momiji Moyōiri Nashiji .. .. .	0.0137	
45	Suzu Kumo Nashiji .. .. .	0.0134	
46	Suzu Kasumi Nashiji .. .. .	0.0134	
47	Suzu Tamamura Nashiji .. .. .	0.0134	
48	Suzu Chū Nashiji .. .. .	0.0068	



# COLLECTION OF METAL WORKS.

(H. Department, Group 93, Class 585.)

The art of alloying is very skilful in Japan from ancient times. There are many rare mixtures such as Shakudō (Nos. 21, 22, 23 and others) and Shibuichi (Nos. 24, 25, 26 and others), which are never known in Europe. Coloring has also a special nature, which shows and imparts beautiful appearance to the single or alloyed metals, as shown in No. 21 and upwards. With chisel and file in numerable figures are produced on it, as shown from No. 1.—No. 20.

No.	NAMES.	VALUE
		(1 sun sq.)
		Yen.
1	Yakikin No. 1 Nanako .. .. .	7.425
2	Shakudō No. 1 Nanako .. .. .	1.700
3	Silver and Shakudō Scale-figured No. 3 Nanako..	2.625
4	Gold-gilded on Silver No. 4 Nanako .. .. .	3.845
5	Shakudō and Shibuichi Ishidatami No. 5 Nanako	2.500
6	Scarlet Copper No. 6 Nanako .. .. .	1.000
7	Shibuichi Nijiu Nanako .. .. .	1.275
8	Yakikin Botan Yujō .. .. .	6.575
9	Shakudō Tate Yujō .. .. .	1.250
10	Gindama Tsuki Yujō .. .. .	1.660
11	Shakudō Shibagaki Yujō .. .. .	1.300
12	Gold-gilded on silver stripe inlaid Yujō .. ..	1.980
13	Gold-gilded on silver Nami Yujō.. .. .	1.930
14	Silver Nata Ishime.. .. .	1.730
15	Shakudō Grape Ishime .. .. .	1.200
16	Gold-gilded on Silver Chidori Ishime .. ..	1.930
17	Shakudō Oresaki Ishime .. .. .	1.150
18	Shibuichi Chidori Ishime .. .. .	0.725
19	Gold-gilded on Silver Nata Ishime .. ..	1.930
20	Brass Chidori Ishime .. .. .	0.350
21	No. 1 Shakudō .. .. .	1.550
22	No. 2 Shakudō .. .. .	0.990
23	No. 3 Shakudō .. .. .	0.710
24	No. 1 Shibuichi .. .. .	1.128
25	No. 2 Shibuichi .. .. .	0.926
26	No. 3 Shibuichi .. .. .	0.522
27	Scarlet Copper .. .. .	0.150
28	Brass .. .. .	0.160
29	Kurumi Copper .. .. .	0.150
30	Su Copper .. .. .	0.140
31	Nashiji Copper .. .. .	0.350
32	Brass .. .. .	0.160
33	Kurumi Copper and Su Copper Mokume ..	0.750
34	Silver and Shakudō Mokume .. .. .	1.150
35	Shakudō Scarlet-coloured Mokume .. ..	0.350
36	No. 1 Kawari Copper .. .. .	0.160
37	No. 2 Kawari Copper .. .. .	0.160
38	No. 3 Kawari Copper .. .. .	0.160
39	No. 4 Kawari Copper .. .. .	0.160
40	Wrought-iron Rust Colouring .. .. .	0.180

## VARIOUS STAGES IN THE MANUFACTURE OF CLOISONNÉ.

(H. Department, Group 93, Class 586.)

In the manufacture of cloisonnés sixteen stages are to be passed. No. 1 shows the pattern, No. 2 cells laid on groundwork, No. 3 solders pasted over, No. 4 solders heated, No. 5 enamel laid for the first time, No. 6 burnt for the first time, No. 7 enamel laid for the second time, No. 8 burnt for the second time, No. 9 enamel laid for the third time, No. 10 burnt for the third time, No. 11 enamel for the fourth time, No. 12 burnt for the fourth time, No. 13 roughly polished, No. 14 last touch, No. 15 last burning, No. 16 complete finish.

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## THE DIFFERENT COLORING OF CLOISONNE.

(H. Department, Group 93, Class 586.)

According to the nature of paints, the tinges of colors, of course, differ. In order to represent figures in enamel, all sorts of colors are to be used. This is the main differently with the manufacture of cloisonné. The colors here shown are 360 kinds, all of which are used in the manufacture. As to the price it all depends upon the execution of design and amount of labour, so it could not be shown here.

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## SPECIMENS OF GOLD AND SILVER THREAD.

(H. Department, Group 100, Class 625.)

Gold and silver thread is one of the handiworks, which is never produced in Europe. Even in this country, the place of manufacture is limited to Kyoto. Accordingly the amount of produce is very small, yet to show the real golden

or silver colour in the fabrics, it is necessarily resorted to. In late years it found the way to foreign market, and begins to be exported. Some threads are very fine while others are large; the way they are used is quite many.

CATALOGUE OF THE GOLD AND SILVER THREAD.

No.	NAME.	SORT.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle	VALUE. Yen.
1	Gold-Thread.	{ Yakiro fun Gold } Thread (with core ) { of cotton thread. }	8 Bu gake. ) One Bundle.	0.048
2	"	"	1 gake.	0.053
3	"	"	1½ "	0.058
4	"	"	2 "	0.064
5	"	"	2½ "	0.075
6	"	"	3 "	0.085
7	"	"	4 "	0.095
8	"	"	5 "	0.105
9	"	"	6 "	0.115
10	"	"	7 "	0.125
11	"	"	8 "	0.135
12	"	"	9 "	0.145
13	"	"	10 "	0.155
14	"	"	12 "	0.180
15	"	"	Muzu.	0.210
16	"	"	Omuzu.	0.240
17	"	"	{ Daidai } { muzu. }	0.270
18	"	"	{ Betsu } { muzu. }	0.300
19	"	"	{ Betsu } { omuzu. }	0.340
20	"	"	{ Mare } { muzu. }	0.380
21	"	{ Yaki hon Gold } Thread (with core ) { of cotton thread. }	8 Bu gake. )	0.165
22	"	"	1 gake.	0.180
23	"	"	1½ "	0.200
24	"	"	2 "	0.240
25	"	"	2½ "	0.290
26	"	"	3 "	0.330
27	"	"	4 "	0.410
28	"	"	5 "	0.460
29	"	"	6 "	0.500
30	"	"	7 "	0.550
31	"	"	8 "	0.600
32	"	"	9 "	0.640
33	"	"	10 "	0.700
34	"	"	12 "	0.820
35	"	"	Muzu.	0.950

No.	NAME.	SORT.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle.	VALUE.
				Yen.
36	Gold-Thread.	{ Mekomi hon Gold Thread (with core of silk thread).	8 Bu gake. } One Bundle.	0.210
37	"	"	1 gake.	0.280
38	"	"	1½ "	0.320
39	"	"	2 "	0.390
40	"	"	2½ "	0.400
41	"	"	3 "	0.460
42	"	"	4 "	0.580
43	"	"	5 "	0.670
44	"	"	6 "	0.790
45	"	"	7 "	0.870
46	"	"	8 "	0.980
47	"	"	9 "	1.080
48	"	"	10 "	1.180
49	"	"	12 "	1.400
50	"	"	Muzu.	1.800
51	"	"	Omuzu.	2.100
52	"	{ Ōaka hon Gold Thread (with core of silk thread).	8 Bu gake. }	0.190
53	"	"	1 gake	0.250
54	"	"	1½ "	0.280
55	"	"	2 "	0.320
56	"	"	2½ "	0.360
57	"	"	3 "	0.400
58	"	"	4 "	0.500
59	"	"	5 "	0.570
60	"	"	6 "	0.680
61	"	"	7 "	0.780
62	"	"	8 "	0.860
63	"	"	9 "	0.970
64	"	"	10 "	1.070
65	"	"	12 "	1.230
66	"	"	{ Shin muzu. }	1.400
67	"	"	{ Shin omuzu. }	1.520
68	"	"	Omuzu.	1.730
69	"	{ Tsune hon Gold Thread (with core of cotton thread).	8 Bu gake. }	0.145
70	"	"	1 gake.	0.165
71	"	"	1½ "	0.185
72	"	"	2 "	0.210
73	"	"	2½ "	0.240
74	"	"	3 "	0.300
75	"	"	4 "	0.380
76	"	"	5 "	0.415
77	"	"	6 "	0.450
78	"	"	7 "	0.500

No.	NAME.	SORT.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle.	VALUE.  Yen.	
79	Gold-Thread.	{ Tsune hon Gold Thread (with core of silk thread).	8 gake. } One Bundle.	0.540	
80	"	" 9 "	" "	0.570	
81	"	" 10 "	" "	0.620	
82	"	" 12 "	" "	0.710	
83	"	" Muzu.	" "	0.850	
84	"	" Omuzu.	" "	0.950	
85	"	{ Fun Gold Thread (with core of cotton thread).	8 Bu } gake	0.045	
86	"	" 1 gake.	" "	0.050	
87	"	" 1½ "	" "	0.055	
88	"	" 2 "	" "	0.060	
89	"	" 2½ "	" "	0.070	
90	"	" 3 "	" "	0.080	
91	"	" 4 "	" "	0.090	
92	"	" 5 "	" "	0.100	
93	"	" 6 "	" "	0.110	
94	"	" 7 "	" "	0.120	
95	"	" 8 "	" "	0.130	
96	"	" 9 "	" "	0.140	
97	"	" 10 "	" "	0.150	
98	"	" 12 "	" "	0.175	
99	"	" Muzu.	" "	0.205	
100	"	" Omuzu.	" "	0.230	
101	"	" { Daidai muzu.	" }	0.260	
102	"	" { Betsu muzu.	" }	0.290	
103	"	" { Betsu omuzu	" }	0.330	
104	"	" { Mare muzu.	" }	0.370	
105	Hira Gold Thread.	{ Yaki hon Kin Ryōmen hira. }	{ (Length, 1 shaku 5 sun 5 bu. Breadth, 2 shaku 7 sun. }	" "	1.780
106	"	{ Tsuneiro hon Kin Ryōmen hira.	" "	" "	1.520
107	"	{ Yaki hon Kin hon Gin Ryōmen hira.	" "	" "	1.050
108	"	{ Fun Kin Ryō- men hira.	" "	" "	0.310
109	"	{ Fun Kin hon Gin Ryōmen hira.	" "	" "	0.300

No.	NAME.	Sort.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle.	VALUE.  Yen.
110	Hira Gold Thread.	{ Hon Gin Ryō- men hira. }	{ Length, 1 shaku 5 sun 5 bu. Breadth, 2 shaku 7 sun. }	One Bundle. 0.290
111	"	{ Yaki hon Kin hira. }	" "	0.670
112	"	{ Tsuneiro hon Kiu hira. }	" "	0.590
113	Silver Thread.	{ Hon Silver Thread (with core of cotton thread). }	{ 8 Bu gake. }	0.045
114	"	"	1 gake.	0.050
115	"	"	1½ "	0.055
116	"	"	2 "	0.060
117	"	"	2½ "	0.070
118	"	"	3 "	0.080
119	"	"	4 "	0.090
120	"	"	5 "	0.100
121	"	"	6 "	0.110
122	"	"	7 "	0.120
123	"	"	8 "	0.130
124	"	"	9 "	0.140
125	"	"	10 "	0.150
126	"	"	12 "	0.175
127	"	"	Muzu.	0.205
128	"	"	Omuzu.	0.230
129	"	"	{ Daidai muzu. }	0.260
130	"	"	{ Betsu muzu. }	0.290
131	"	"	{ Betsu ōmuzu. }	0.330
132	"	"	{ Mare muzu. }	0.370
133	{ Coloured Metal Thread. }	Bronze Coloured.	8 Bu gake.	0.045
134	"	"	1 gake.	0.050
135	"	"	1½ "	0.055
136	"	"	2 "	0.060
137	"	"	2½ "	0.070
138	"	"	3 "	0.080
139	"	"	4 "	0.090
140	"	"	5 "	0.100
141	"	"	6 "	0.110
142	"	"	7 "	0.120
143	"	"	8 "	0.130
144	"	"	9 "	0.140
145	"	"	10 "	0.150
146	"	"	12 "	0.175

No.	NAME.	SORT.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle.	VALUE. Yen.
147	{ Coloured Metal Thread. }	Bronze Coloured .. Muzu.	One Bundle.	0.205
148		" " Ōmuzu.	"	0.230
149		" " { Daidai Muzu. }	"	0.260
150		" " { Betsu muzu. }	"	0.290
151		" " { Betsu ōmuzu. }	"	0.330
152		" " { Mare muzu. }	"	0.370
153		Red Coloured ... 8 Bu gake.	"	0.045
154	"	" " 1 gake.	"	0.050
155	"	" " 1½ "	"	0.055
156	"	" " 2 "	"	0.060
157	"	" " 2½ "	"	0.070
158	"	" " 3 "	"	0.080
159	"	" " 4 "	"	0.090
160	"	" " 5 "	"	0.100
161	"	" " 6 "	"	0.110
162	"	" " 7 "	"	0.120
163	"	" " 8 "	"	0.130
164	"	" " 9 "	"	0.140
165	"	" " 10 "	"	0.150
166	"	" " 12 "	"	0.175
167	"	" " Muzu.	"	0.205
168	"	" " Ōmuzu.	"	0.230
169	"	" " { Daidai muzu. }	"	0.260
170	"	" " { Betsu muzu. }	"	0.290
171	"	" " { Betsu ōmuzu. }	"	0.330
172	"	" " { Mare muzu. }	"	0.370
173	"	Ugnisu Iro .... 8 Bu gake.	"	0.045
174	"	" " 1 gake.	"	0.050
175	"	" " 1½ "	"	0.055
176	"	" " 2 "	"	0.060
177	"	" " 2½ "	"	0.070
178	"	" " 3 "	"	0.080
179	"	" " 4 "	"	0.090
180	"	" " 5 "	"	0.100
181	"	" " 6 "	"	0.110
182	"	" " 7 "	"	0.120
183	"	" " 8 "	"	0.130
184	"	" " 9 "	"	0.140
185	"	" " 10 "	"	0.150
186	"	" " 12 "	"	0.175
187	"	" " Muzu.	"	0.205
188	"	" " Ōmuzu.	"	0.230

No.	NAME.	SORT.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle	VALUE.
189	{ Coloured Metal Thread. }	Uguisu Iro.....	{ Daidai muzu. }	Yen. 0.260
190			{ Betsu muzu. }	0.290
191			{ Betsu ōmuzu. }	0.330
192			{ Mare muzu. }	0.370
193				
194	"	Purple Coloured. 8 Bu gake.	"	0.045
195	"	" 1 gake.	"	0.050
196	"	" 1½ "	"	0.055
197	"	" 2 "	"	0.060
198	"	" 2½ "	"	0.070
199	"	" 3 "	"	0.080
200	"	" 4 "	"	0.090
201	"	" 5 "	"	0.100
202	"	" 6 "	"	0.110
203	"	" 7 "	"	0.120
204	"	" 8 "	"	0.130
205	"	" 9 "	"	0.140
206	"	" 10 "	"	0.150
207	"	" 12 "	"	0.175
208	"	" Muzu.	"	0.205
209	"	" Ōmuzu.	"	0.230
210	"	" { Daidai muzu. }	"	0.260
211	"	" { Betsu muzu. }	"	0.290
212	"	" { Betsu ōmuzu. }	"	0.330
213	"	" { Mare muzu. }	"	0.370
214	"	Blue Coloured . 8 Bu gake.	"	0.045
215	"	" 1 gake.	"	0.050
216	"	" 1½ "	"	0.055
217	"	" 2 "	"	0.060
218	"	" 2½ "	"	0.070
219	"	" 3 "	"	0.080
220	"	" 4 "	"	0.090
221	"	" 5 "	"	0.100
222	"	" 6 "	"	0.110
223	"	" 7 "	"	0.120
224	"	" 8 "	"	0.130
225	"	" 9 "	"	0.140
226	"	" 10 "	"	0.150
227	"	" 12 "	"	0.175
228	"	" Muzu.	"	0.205
229	"	" Ōmuzu.	"	0.230
		" { Daidai Muzu. }	"	0.260



No.	NAME.	Sort.	No. Two hundred times round a plank of 1 shaku 1 sun of kane measure make a Bundle	VALUE.
230	{ Coloured Metal Thread. }	Blue Coloured..	{ Betsu muzu. }	Yen. 0.290
231	"	"	{ Betsu ōmuzu. }	" 0.330
232	"	"	{ Mare muzu. }	" 0.370
233	"	{ Yellow-green Coloured. }	.. 8 Bu gake.	" 0.045
234	"	"	1 gake.	" 0.050
235	"	"	1½ "	" 0.055
236	"	"	2 "	" 0.060
237	"	"	2½ "	" 0.070
238	"	"	3 "	" 0.080
239	"	"	4 "	" 0.090
240	"	"	5 "	" 0.100
241	"	"	6 "	" 0.110
242	"	"	7 "	" 0.120
243	"	"	8 "	" 0.130
244	"	"	9 "	" 0.140
245	"	"	10 "	" 0.150
246	"	"	12 "	" 0.175
247	"	"	Muzu.	" 0.205
248	"	"	Ōmuzu.	" 0.230
249	"	"	{ Daidai. muzu. }	" 0.260
250	"	"	{ Betsu muzu. }	" 0.290
251	"	"	{ Betsu ōmuzu. }	" 0.330
252	"	"	{ Mare muzu. }	" 0.370

## SPECIMENS OF ORNAMENTAL CORD-KNOTS.

(H. Department, Group 100, Class 632.)

The Cord-Knots were used from ancient time on literary as well as military articles, used in ornaments. Adding the beautiful appearance to the things to look upon, it would be suitable to be used on chairs, curtains and other things of furniture it will be quite an improvement. The specimens are open to the reference of visitors.

No.	NAME.	VALUE OF ONE.
		Yen.
1	Kamashiki Knots .. .. .	0.675
2	Kiri Knots .. .. .	0.200
3	Sweet Flag Knots .. .. .	0.300
4	Keman Knots .. .. .	0.180
5	Tobutsu Two-fold Net Knots .. .. .	0.300
6	Kojima Kesa Knots .. .. .	0.440
7	Crysanthemum flower Knots .. .. .	0.450
8	Cherry blossom Knots .. .. .	0.180
9	Sangai matsu Knots .. .. .	0.200
10	Mokukwagata Knots .. .. .	0.375
11	Agemaki Doshin Knots .. .. .	0.375
12	Takara Knots .. .. .	0.375
13	Kokin Neo Knots .. .. .	0.450
14	Haorio Knots .. .. .	0.150
15	Katabami Knots .. .. .	0.150
16	Tea-pots Chichio Knots .. .. .	0.195
17	Round Fan shaped Knots .. .. .	0.270
18	Tobutsu Butterfly Knots .. .. .	0.120
19	Kake Knots .. .. .	0.120
20	Kano Knots .. .. .	0.225
21	Kakaobi Knots .. .. .	0.225
22	Chiatsuho-o Knots .. .. .	0.180
23	Nadeshiko Knots .. .. .	0.300
24	Rokuyo Knots .. .. .	0.450
25	Female Tobtsu Tori Knots .. .. .	0.180
26	Male " " " " .. .. .	0.180
27	Mosquito-nets Suspension Cord Knots .. .. .	0.180
28	Mitsu Awaji Knots .. .. .	0.270
29	Dragon Fly shaped Knots .. .. .	0.180
30	Kikyo Flower Knots .. .. .	0.225
31	Chatsuho Chichio Knots .. .. .	0.225
32	Hoop Knots.. .. .	0.225
33	Hiogi Knots .. .. .	0.195
34	Shippo Knots .. .. .	0.195
35	Masquito-net Suspension Cord Knots .. .. .	0.180
36	Yukimochi Zasa Knots .. .. .	0.300
37	Dragon Fly Knots.. .. .	0.225
38	Sweet Flag Knots.. .. .	0.225
39	Dragon Fly Knots.. .. .	0.300
40	The Morning Glory Flower Knots .. .. .	0.225
41	Cicada Knots .. .. .	0.180
42	Tortoise Knots .. .. .	0.300
43	Asao Knots.. .. .	0.150
44	Mokko Knots .. .. .	0.225
45	Chatsuho Nagao Knots .. .. .	0.300
46	Okina Knots .. .. .	0.270
47	Lily Flower Knots .. .. .	0.300
48	Omoi Knots .. .. .	0.150
49	Tobtsu Butterfly Knots .. .. .	0.270
50	Crane Knots .. .. .	0.225
51	Omogai Knots .. .. .	0.150
52	Tobtsu Butterfly Knots .. .. .	0.450
53	Yaye Kikyō Knots .. .. .	0.420
54	Omoi Knots .. .. .	0.300

No.	NAME.	VALUE OF ONE.
		Yen.
55	Bird Knots .. .. .	0.180
56	Sazanka Knots .. .. .	0.150
57	Tobutsu Takara Knots .. .. .	0.225
58	Knyō Knots .. .. .	0.525
59	Shirikai Knots .. .. .	0.150
60	Arai Kutsuwa Hanakawa Knots .. .. .	0.180
61	Muchi-no-o Knots .. .. .	0.120
62	Kusafuji Knots .. .. .	0.330
63	Chatsubo Chichi-o Knots .. .. .	0.150
64	Chatsubo Chichi-o Knots .. .. .	0.270
65	Suwo Mauehimo Knots .. .. .	0.150
66	Sasa-no-ha Knots .. .. .	0.150
67	Tobutsu-Kiku Knots .. .. .	0.375
68	Matsu Knots .. .. .	0.150
69	Fuji Flower Knots .. .. .	0.420
70	Yaye Chrysanthemum Knots .. .. .	0.300
71	Plum-tree Flower Knots .. .. .	0.225
72	Fuji Knots .. .. .	0.180
73	Hokkeshiū Kesa Knots .. .. .	0.600
74	Doshin Knots .. .. .	0.090
75	Nagao Knots .. .. .	0.150
76	Futatsuba Knots .. .. .	0.225
77	Azuma Knots .. .. .	0.150
78	Chatsubo Chichi-o Knots .. .. .	0.300
79	Fuji Knots .. .. .	0.300
80	Tsubaki Flower Knots .. .. .	0.300
81	Usagi Kashira Knots .. .. .	0.120
82	Tobutsu Chrysanthemum Flower Knots .. .. .	0.330
83	Hojiū Knots .. .. .	0.150
84	Agemaki Knots .. .. .	0.150
85	Kusafuji Knots .. .. .	0.225
86	Muchi Knots .. .. .	0.120
87	Chatsubo Chichi-o Knots .. .. .	0.225
88	Chatsubo Chichi-o Knots .. .. .	0.225
89	Two-fold Kukurikiri Fringe .. .. .	0.225
90	One-fold Kukurikiri Fringe .. .. .	0.450
91	Hitoe Kukurikiri Fringe .. .. .	0.225
92	Atamagakari Yorikaeshi Fringe .. .. .	0.450
93	Kanamonotsuki Yorikaeshi Fringe .. .. .	0.520
94	Atama Amiage Yorikaeshi Fringe .. .. .	0.225
95	Natsumegata Atamagakari Yorikaeshi, Fringe .. .. .	0.450
96	Metal Ornaments Attached Yorikaeshi Fringe .. .. .	0.525

## SPECIMENS OF FANS TO BE USED IN CEREMONIES.

(H. Department, Group 106, Class 667.)

No. 1 is the imitation of Akome fan, which is said to be made by the wife of Taira no Atsumori, to present it to Buddha, to pray for the happiness of her husband. The

original is treasured in the Mikagedo of Kyoto. No. 2 is the treasure of the Mikagedo also, which is the imitation of the fan belonging to the Emperor Gosakuramachi (1763—1813). No. 3 those used in the Imperial Court. No. 4 by nobles, No. 5 by priest. The shapes and figures of those fans, if adapted to the export articles, there is no doubt, some improvement will be made.

No.	NAME.	VALUE A PIECE.
1	Akome Fan.. .. .	Yen. 25.000
2	Hi Ōgi .. .. .	15.000
3	Hi Ōgi .. .. .	15.000
4	Hi Ōgi .. .. .	0.500
5	Hi Ōgi .. .. .	0.500

## SPECIMENS OF FANS FOR HOME USE.

(H. Department, Group 106, Class 667.)

The fans numbered 6, 8, 11 are used by nobles, Nos. 7, 9, 10 by priest, Nos. 12, 13 by samurai, No. 14 in the time of court foot ball, No. 15 in the time dancing, No. 16 in the time of war (in camp.), No. 17 in ordinary time (in peace).

Round Fans are generally used without classical forms.

### FAN.

No.	NAME.	VALUE OF A PIECE.
6	Chūkei .. .. .	Yen. 3.000
7	Chūkei .. .. .	2.500
8	Summer Fans .. .. .	2.000
9	Summer Fans .. .. .	1.500
10	Setsu do Fans .. .. .	0.800
11	Palace Fans .. .. .	1.200
12	Palace Fans .. .. .	0.500
13	Kodenchiū .. .. .	0.200
14	Meniawari Fans .. .. .	2.000
15	Dance Fans.. .. .	3.000
16	Military Fans .. .. .	3.500
17	Thin Ribbed Fans .. .. .	0.100

ROUND FANS.

No.	VALUE OF A PIECE.	No.	VALUE OF A PIECE.	No.	VALUE OF A PIECE.
	Yen.		Yen.		Yen.
1	1.500	7	0.180	13	0.100
2	1.600	8	0.150	14	0.040
3	1.000	9	0.250	15	0.120
4	0.380	10	0.015	16	0.040
5	0.060	11	0.150	17	0.100
6	0.060	12	0.100	18	0.150

SPECIMENS OF FANS FOR EXPORT.

(H. Department, Group 100, Class 667.)

As for the revolution of fans it will be convenient if the order is followed.

The fans from No. 1 to No. 13 have prevailed during 1870—78. During that time the outside ribs of white bamboo were painted black with gold lacquering on them, or the ribs were made of bones, or the colour of paper was changed. But as to the shape and size there were no great change. In about 1879—1880 the modification of priests' fan commenced but the old shape yet remained. In about 1883—1884 dancing fans began to be imitated and old shape began to disappear and almost all fans were ornamented with thread. About 1887 the great ribs were made into cloven shape and breadth was widened. (*The old shaped fans having 30 ribs, of which were lessened to 8 or 6.*) The cloven ribs were again divided to 3 or 4 branches; but in the present days, the narrow breadths prevail.

The round fan came into fashion since 1877 and there is not much change. In the following price list, the fans to be sold in more than one hundred are given.

No.	VALUE OF A PIECE.	No.	VALUE OF A PIECE.	No.	VALUE OF A PIECE.
	Yen.		Yen.		Yen.
1	0.045	25	0.150	49	0.880
2	0.055	26	0.200	50	0.300
3	0.050	27	0.220	*51	0.055
4	0.050	28	0.200	52	0.018
5	0.060	29	0.395	53	0.0038
6	0.120	30	0.270	54	0.0050
7	0.080	31	0.085	55	0.040
8	0.150	32	0.170	56	0.075
9	0.070	33	0.100	57	0.010
10	0.135	34	0.100	58	0.045
11	0.060	35	0.250	59	0.035
12	0.500	36	0.280	60	0.200
13	0.300	37	0.250	61	0.100
14	0.180	38	0.130	62	0.035
15	0.135	39	0.300	63	0.120
16	0.135	40	0.190	64	0.075
17	0.180	41	0.190	65	0.120
18	1.300	42	0.270	66	0.060
19	0.050	43	0.200	67	0.050
20	0.180	44	0.330	78	0.065
21	0.300	45	0.300	69	0.070
22	0.300	46	0.600	70	0.965
23	0.100	47	0.530		
24	0.070	48	0.300		

\* The figures of 51—70 are the values of Round Fans.

## SPECIMENS OF FIGURED LEATHERS.

(H. Department, Group 110, Class 702.)

In the leathers the figures, pictures or plaids are impressed, mostly used in the articles of war, and in pouches. From No. 1 to 60 are used in the articles of war, and from 60 to 90 for pouches.

No.	NAME.	VALUE (1 SUN SQ.)
		Yen.
1	Tempiō Leather .. .. .	0.010
2	"Hachiman" Letter Figured Leather .. .. .	0.010
3	Shōhei Leather .. .. .	0.010
4	Lion Round Figured Leather .. .. .	0.010
5	Round Floral Figured Leather .. .. .	0.010
6	Hō-ō Round Figured Leather .. .. .	0.010
7	Lion Figured Leather .. .. .	0.010
8	Fudōson Figured Leather .. .. .	0.010
9	Lion Round Figured Leather .. .. .	0.010

No.	NAME.	VALUE
		(1 SUN SQ.)
		Yen.
10	Round Figured Picture Leather .. ..	0.010
11	Round Floral Figured Leather .. ..	0.010
12	Round Floral Figured Leather .. ..	0.010
13	Coloured Katsumi Leather .. ..	0.010
14	Thunder Figured Leather .. ..	0.010
15	Floral Diamond-shaped Figured Leather .. ..	0.010
16	Tortoise-shell Shape Figured Leather .. ..	0.010
17	Murasaki Leather .. ..	0.010
18	Shigeme Knot Leather .. ..	0.010
19	Purple Yuwata Leather .. ..	0.010
20	Black Yuwata Leather .. ..	0.010
21	Yuwata Leather .. ..	0.010
22	Variagated Colours Leather .. ..	0.010
23	Rope-like Surface Leather .. ..	0.010
24	Knotted Rope-like Surface Leather .. ..	0.010
25	Okatsumi Leather .. ..	0.010
26	Purple Brocade Leather .. ..	0.013
27	Tea-coloured Butterfly Figured Leather .. ..	0.010
28	Brocade Leather .. ..	0.010
29	Small Cherry Flower Figured Leather .. ..	0.010
30	Coloured Cherry Flower Figured Leather .. ..	0.010
31	Black Small Cherry Flower Figured Leather .. ..	0.010
32	Minute Butterfly and Birds Figured Leather .. ..	0.010
33	Kakutsunagata Shōbu Leather .. ..	0.015
34	Sugitachi Shōbu Leather .. ..	0.015
35	Rogan Shōbu Leather .. ..	0.015
36	Maple-tree and Deer Figured Shōbu Leather .. ..	0.015
37	Horse Figured Shōbu Leather .. ..	0.015
38	Tomoe Figured Shōbu Leather .. ..	0.015
39	Butterfly and Birds Figured Leather .. ..	0.015
40	Shida Figured Leather .. ..	0.010
41	Omodaka Figured Leather .. ..	0.010
42	Tea-coloured Katsumi Figured Leather .. ..	0.010
43	Cherry and Water Figured Leather .. ..	0.010
44	Diamond-shaped Chrysanthemum Small Figured Leather .. ..	0.010
45	Tate Waku Cloud Figured Leather .. ..	0.010
46	Ōshiai Chrysanthemum Figured Leather .. ..	0.010
47	Wave Figured Leather .. ..	0.010
48	Buff-coloured Birds and Flower Figured Leather .. ..	0.010
49	Yukiwa Figured Leather .. ..	0.010
50	Buff-coloured Old Figured Leather .. ..	0.010
51	Chrysanthemum and Kiri Figured Leather .. ..	0.010
52	Buff-coloured Chrysanthemum Figured Leather .. ..	0.010
53	Waves and Chidori Figured Leather .. ..	0.010
54	Large Quail Shibori Leather .. ..	0.250
55	Tea-coloured Quail Shibori Leather .. ..	0.250
56	Small Quail Shibori Leather .. ..	0.250
57	Tea-coloured Rope-like Surface Quail Shibori Leather .. ..	0.250
58	Uzunramaki Leather .. ..	0.130
59	Coloured Pine, Bamboo, and Pine Tree Figured Leather .. ..	0.010
60	Shokkōgata Figured Leather .. ..	0.010
61	Peony Flower Figured Leather .. ..	0.010
62	Coloured Ōshiai Chrysanthemum Figured Leather .. ..	0.015
63	Tatewaku Floral Round Figured Leather .. ..	0.016

No.	NAME.	VALUE (1 SUN SQ.)
		Yen.
64	Coloured Kodomoe Figured Leather.. ..	0.013
65	Coloured Tomoe Figured Leather .. ..	0.013
66	Ancient Figured Leather .. ..	0.013
67	Round Fan Sarasa Figured Leather.. ..	0.013
68	Lengthwise Striped Figured Leather .. ..	0.013
69	Diamond-shaped Figured Leather .. ..	0.013
70	Coloured Cloud Hō-ō Figured Leather .. ..	0.013
71	Tea-coloured Flower and Bird Sarasa Figured Leather ..	0.014
72	Tea-coloured Ancient Figured Leather .. ..	0.025
73	Tea-coloured Ancient Figured Leather .. ..	0.025
74	Tea-coloured Hō-ō Figured Leather.. ..	0.025
75	Old Figured Leather .. ..	0.025
76	Kikinsui Figured Leather .. ..	0.020
77	Waves and Chidori Figured Leather .. ..	0.020
78	Old Floral Figured Leather .. ..	0.020
79	Water and Rabbit Figured Leather .. ..	0.020
80	Water and Tomoe Figured Leather .. ..	0.014
81	Kasumi and Chidori Figured Leather .. ..	0.014
82	Flower Collection Picture Leather .. ..	0.020
83	Kusudama Picture Leather .. ..	0.020
84	Couch-shell Collection Picture Leather .. ..	0.020
85	Shikishi Picture Leather .. ..	0.020
86	Buddha Picture Figured Leather .. ..	0.020
87	Hiakumin-shu Picture Leather .. ..	0.020
88	Grass Flowers Pictorial Leather .. ..	0.020
89	Toys Pictorial Leather .. ..	0.020
90	Fau Paper Picture Leather .. ..	0.020

## SPECIMENS OF METALLIC NETTINGS.

(H. Department, Group 117, Class 742.)

The metallic nettings are greatly used, and the manufactures are accordingly extensive. Of late years architectural changes gradually encroaching, the stoves began to be set and the necessity of stove screen were felt, the demand for the nettings consequently increased. The most substantial and comely ones are shown here below.



No.	VALUE (1 Sun sq.)	No.	VALUE (1 Sun sq.)	No.	VALUE (1 Sun sq.)
	Yen.		Yen.		Yen.
1	0.095	15	0.095	29	0.095
2	0.070	16	0.095	30	0.095
3	0.095	17	0.095	31	0.095
4	0.095	18	0.095	32	0.070
5	0.095	19	0.095	33	0.095
6	0.070	20	0.040	34	0.020
7	0.095	21	0.020	35	0.040
8	0.070	22	0.040	36	0.020
9	0.095	23	0.095	37	0.095
10	0.095	24	0.095	38	0.095
11	0.095	25	0.095	39	0.020
12	0.095	26	0.040	40	0.020
13	0.070	27	0.020	41	0.095
14	0.070	28	0.095	42	0.020

## SPECIMENS OF JOINTS IN WOOD WORKS.

(H. Department, Group 117.)

The joints are the most important part in the wood-works. The strength of boxes, tables, door leafs, and frame works etc. depends upon this. The way in which they are applied to is given below, but the price cannot be fixed as it varies according to the size and nature of timbers.

No.	NAME OF JOINTS.	PURPOSE.
1	Chigiri Uchi Hozo.. ..	Boxes.
2	Ippō Tadzuna Hozo .. ..	Braziers.
3	Uchi Hozo .. ..	Boxes.
4	Masu Hozo.. ..	Small Boxes.
5	Iri Wa .. ..	Boxes.
6	Chigiri Hozo .. ..	Braziers.
7	Gowai Hozo Iri Wa .. ..	Boxes.
8	Orinawashi Chigiri Hozo.. ..	Braziers.
9	Masuguni Hozo .. ..	Braziers.
10	Uchinaki Keshi Hozo .. ..	Boxes.
11	Orinawashi Yahazu Hozo.. ..	Braziers.
12	Shiinomi Hozo .. ..	Small Boxes.
13	Kudaki Arikō Hashibami .. ..	Shelf (Lacquered).
14	Uchi Hozo Koguchi Hashibami .. ..	Selves (Lacquered).
15	Arizon Ura Hashibami .. ..	Kendon (Box) and Tables.
16	Uchi Hozo Hashibami .. ..	{ All kinds of doors which open on hinges.

No.	NAME OF JOINTS,	PURPOSE.
17	Ichimai Hozo Bintadome .. .. .	Katamen door frame.
18	Menkoshi Uchikomi Nimai Hozo ..	Door Frames.
19	{ Shikisan Nimai Hozo Uchidashi Tsuba- dome .. .. . }	Door Kamachi Surizan.
20	Katamen Hokodome .. .. .	Frames.
21	Marudome Nimai Hozo .. .. .	Frames.
22	Sammai Uchidashi Hozo Mengoshi ..	Door Frames.
23	Uchidashi Mengoshi, Nimai Hozo ..	Door Frames.
24	Ichimai Kawa Hozo Hakodome .. ..	Frames.
25	Marudome Nimai Hakoakaki .. ..	Frames.
26	Uwaba Menkoshi Iri Wa Nimai Hozo ..	Fire place Frames.
27	Iri Wa Aridome .. .. .	Fire place Frames.
28	Marudome Uchikndaki Ari .. ..	Frames.
29	Dai Wa Hozo Hana Aridome .. ..	Rings of Standa.
30	Nimai Kama Mendome .. .. .	Door Frames.
31	Ryomen Ichimai Hozo Hakodome ..	Door Frames.
32	Nimai Kama Hozo Mendome .. ..	Frames.









# EXPLANATORY NOTES

ON THE

## EXHIBITS

TO THE

→ WORLD'S + COLUMBIAN + EXPOSITION ←

AT

CHICAGO, U. S. A.

1893.

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CENTRAL METEOROLOGICAL OBSERVATORY

OF JAPAN.

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TOKIO.









## INTRODUCTION.

The Central Meteorological Observatory of Japan was founded in 1875 in the Section of Land Survey of the Geographical Bureau, Home Department at *Tokio*. After undergoing several vicissitudes, the Observatory became independent on August 3rd 1887 and was placed under a direct supervision of the Minister of State for Home Affairs, authorized by the Imperial Ordinance No. XLI regarding meteorological observatory and stations; henceforth its administrative organization was promulgated by the Imperial Ordinance No. CLVI on August 2nd 1890. As prescribed in the later notification, the Central Meteorological Observatory controls meteorological affairs of the Empire, takes charge of the investigation of its meteorology and issues weather forecasts and storm warnings.

The operations of the Observatory are divided into three branches, viz., Service of Observations, Service of Statistics and Service of Indications.

The business to be transacted in the service of Observations is the following:

- Tokio meteorological observations,
- Earthquake observations,
- Observations of atmospheric electricity,
- Observations of terrestrial magnetism,
- Examinations of micro-organisms and impurities in air,
- Verifications of meteorological instruments.

The Service of Statistics investigates and prepares the following reports:

- Meteorological reports of stations,
- Meteorological reports of lighthouses,
- Meteorological reports of ships,
- Reports on earthquakes,
- Reports on precipitation and temperature at minor stations,
- Reports on thunderstorm,
- Reports on phenology.

In the Service of Indications the following business is performed :

Weather forecasts,  
Storm warnings,  
Meteorological signals.

Our present high officials are

Director :

Titular Meteorologist, K. Kobayashi.

Chief of the Service of Statistics :

Titular Meteorologist, K. Nakamura, *Rigakushi*.

Chief of the Service of Indications :

Titular Meteorologist, Y. Wada, *Rigakushi*.

Chief of the Service of Observations :

Titular Meteorologist probationer, H. Masato.

The Exhibits of the Observatory to the World's Columbian Exposition of Chicago are as follows :

Organization of the meteorological system in Japan.

Diagram showing the increase of meteorological stations in Japan.

Chart of meteorological and signal stations and lighthouses (reporting meteorological observations) of Japan.

Report of the meteorological observations at Tokio, 1876-1890.

Report of the meteorological observations in Japan, 1886-1890.

Report on earthquake observations in Japan, 1885-1890.

Specimen of Tri-daily Weathermaps.

Reports on the areas of low and high pressure in Japan, 1883-1890.

Charts showing seasonal distributions of air pressure and wind over Japan.

Charts showing seasonal distributions of air temperature and weather over Japan.

Charts showing seasonal distributions of amount of precipitation over Japan.

Charts showing frequency of earthquakes in Japan, the great earthquakes of *Kumamoto* and *Mino-Owari*.

The climate of Japan.

Report on high level meteorological observations in Japan.

## I. Organization of the Meteorological system in Japan.

It is mentioned in a certain official record the regular observations once a day were commenced in August of the year 1835 at the Government Astronomical Observatory in *Yedo* (namely Tokio) and that the instruments used were only the barometer and thermometer which have been presented from the Dutch Government to the *Shogun* of that day; it is perhaps the first instrumental meteorological observations made in our country. Unfortunately all the results of these valuable observations were missed, by the commotion of the Great Restoration of *Meiji* Era; thereupon as we have considered it proper to count the outset of our meteorological affairs from the year 1872, this volume has been prepared so as to summarize an account of all the facts and events happened on our meteorological works in the course of twenty one years, 1872-1892. In this not a long period, all things have progressed notably in our country; especially on the meteorological works, despite the business quite newly founded, has been made a noteworthy improvement now-a-days. All the laws and rules concerning the methods and calculations of observations and reports, and the organizations of the Central Observatory as well as of Provincial Stations are also contained in this volume.

Among historical account of our Observatory the followings are the most important:

- 1875, 1st June: Establishment of the Observatory.
- 1877, 1st April: Commencement of international simultaneous observations.
- 1882, 1st July: Adoption of metric system.
- 1883, 16th February: Opening of weather telegraphy once a day and weathermaps first published.
- 1883, 26th May: Warning telegraphs first issued.
- 1883, 19th July: Rules for storm signals notified.
- 1883, 12th August: Foreign telegrams received for the first time.
- 1883, 1st November: First signal mast erected at *Shinagawa*, (near Tokio).
- 1884, 1st July: Commencement of tri-daily meteorological telegrams and weathermaps published.

- 1886, 1st January: Hourly observations commenced at *Tokio*.  
 1887, 3rd August: Imperial Ordinance referring to the meteorological observatory and meteorological stations promulgated.  
 1887, 10th August: Ministerial notification concerning the execution of the above decree.  
 1887, 11th November: Fifty one provincial stations appointed.  
 1888, 10th March: Weather indications first issued.  
 1888, 31st March: I. Arai, the Director, placed on the Retired List and K. Kobayashi succeeded the post.  
 1890, 2nd August: Administrative organization of the Observatory promulgated.  
 1892, 5th May: Ministerial notification concerning the execution of the decree referring to the Observatory and stations revised.  
 1892, 1st July: Rules for meteorological signals and local weather indications decided.

## II. Diagram showing the increase of meteorological stations in Japan.

Although meteorological station was first erected in 1872 as mentioned in "*Organization of the meteorological system*", since the importance of the meteorological observations was not appreciated by the public, number of existing stations at the end of the year 1878, that is in the period of seven years, did hardly exceed four throughout the Empire. But in the course of five years since 1879, as the necessity of meteorological observations has been much recognized and on account of an execution of storm warnings had to be proposed, a rapid increase of stations has been a striking fact, the number reaching twenty three in all. Since then the regulation relating to the resources of meteorological services was sanctioned by *His Majesty* the Emperor and the positions of stations appointed by the Minister of Home Affairs. All these steps conjointly influenced a sudden rise in the number of stations, so that in 1889 six were added to the list, eight in 1890; thus we

had, in the close of the year 1891, forty six stations in the Empire including ten stations established during the years 1884-1888. Of course these are not sufficient for our purpose, yet we might dare to presume that, in spite of a newly introduced service, it will be a rare example not so often experienced in other countries to make any such striding progress in the course of only twenty years.

### III. Chart of meteorological and signal stations and lighthouses of Japan.

Japan is situated between  $24^{\circ} 5'$  and  $50^{\circ} 56'$  of North Latitude,  $122^{\circ} 45'$  and  $156^{\circ} 32'$  of East Longitude. Her principal parts lie between  $26^{\circ}$  and  $45^{\circ}$  of Latitude,  $146^{\circ}$  and  $128^{\circ}$  in Longitude, amongst which the most important are *Honshu* (Nippon), *Kiushu* and *Shikoku*. The remotest stations are *Naha* ( $26^{\circ}$  N.) in the south, *Soya* ( $46^{\circ}$  N.) in the north, *Naha* ( $128^{\circ}$  E.) in the west, and *Nemuro* ( $145^{\circ}$  E.) in the east. When we compute the ratio of the number of existing meteorological stations to the area of our country, we will obtain in average one station in every 8,006 square kilometres.

In the number stated above, nine Stations are of the first order, that is, making hourly observations, and thirty seven of the second order which execute six daily observations at  $2^h$ ,  $6^h$ ,  $10^h$ , am and pm. Besides, there are fifty lighthouses, lightships and lightstaffs making the same six daily observations as the stations of the second order; but they are so many grouped in some coasts, whilst along the West and North coasts we find a great gap.

At present Temperature and Rainfall Stations are two hundred and two in number; Temperature Stations one hundred and forty four, Rainfall Stations fifty.

As we have already made full allusion to in "*Organization of the meteorological system*", the rules regarding storm signals was prescribed in 1883; thereafter at the end of the year 1891, the number of Signal Stations reached sixty three. If we calculate this number so as to be proportioned to the length of our coast, we will find a ratio approximately of one Signal Station in every 250 kilo-

metres. Hitherto signal stations have been erected mostly in ports frequented by steamers, so there is a further need to extend it also to fishing villages, the project of which would be achieved by and by with an elongation of telegraphic lines.

#### IV. Report of the meteorological observations at Tokio 1876-1890.

The Central Meteorological Observatory was established in 1875. At that time, observations were made only tri-daily, viz. at 9<sup>h</sup> 30<sup>m</sup> am, 3<sup>h</sup> 30<sup>m</sup> pm and 9<sup>h</sup> 30<sup>m</sup> pm; on January 1st 1878, they were increased to tri-hourly, that is, at 3<sup>h</sup> am, 6<sup>h</sup> am, 9<sup>h</sup> am, noon, 3<sup>h</sup> pm, 6<sup>h</sup> pm, 9<sup>h</sup> pm and midnight; on January 1st 1885, hourly observations were commenced in lieu of them, that system continuing yet now. This report contains the results of meteorological observations during the period of 15 years, from 1875 to 1890; its principal subjects being air pressure, air temperature, tension of vapour, relative humidity, wind direction, wind velocity, cloud amount, duration of sunshine, earth temperature, maximum solar radiation, minimum terrestrial radiation, precipitation, evaporation and ozone amount with all their changes, and miscellaneous remarks; also several reports such as on high level observations of Mount *Fuji*, *Gozaishodake* and *Ontake*, together with other special reports.

#### V. Report of the meteorological observations in Japan, 1886-1890.

All meteorological works of Provincial Stations are conducted in uniform system throughout the Empire; the kinds of instruments to be used and their arrangements, methods of observations and calculations, and forms of all reports are determined by the Director of the Central Observatory. This report contains the annual results of meteorological observations of all stations for the recent five years since 1886, in which no distinctions being made between the

first and second order, all observations have been taken at 2<sup>h</sup> am, 6<sup>h</sup> am, 10<sup>h</sup> am, 2<sup>h</sup> pm, 6<sup>h</sup> pm and 10<sup>h</sup> pm daily. The contents are air pressure, air temperature, tension of vapour, relative humidity, wind direction, wind velocity, precipitation, cloud direction, cloud speed, cloud amount, cloud forms, days of different kinds of weather and various miscellaneous notes.

## VI. Report on earthquake observations in Japan, 1885-1890.

Seismometrical observations were for the first time made in 1875 in the Section of Land Survey of the Geographical Bureau at *Aoicho, Tokio*, where the *Palmieri's* Seismograph was employed. Since 1884, the *Milne-Gray's* Seismograph has been used; in the next year, the forms of earthquake record were distributed from the Observatory to each Station and Local Districts Office in which the methods of observations and means of distinguishing intensities have been explained, and in June 1891, all Provincial Stations were ordered to report by telegrams on every earthquake occurrence, its exact time and intensity. This report contains all observations made either by instruments or by feelings in about four hundred localities during the period of six years (1885-1890), and the results of seismometric observations at Tokio since its beginning, the headings treated being frequency of earthquakes, areas, time, intensity and its distribution over the Empire.

Number of earthquakes experienced on the whole country during these six years are 3,842, annual mean 640 and daily mean 1.7; the maximum frequency falling in August. However on July 28th 1889, *Kumamoto* was visited by a great earthquake which has been followed by incessant shocks over a considerable length of days, so that the mean of six years has been affected very much. Rejecting this we have obtained a monthly mean 49, the maximum being in May (65), the minimum in August (42); in intensities we have 55 % of slight, 38 % of feeble and 7 % of heavy shocks (falling down of lightly placed bodies or producing cracks in walls), the maximum heavy shocks occurring in February and April, the minimum in June.



## VII. Specimen of Tri-daily Weathermaps.

On February 16th in 1883, a system of regular meteorological telegrams, once a day, was organized, thereby daily weathermaps published at the Central Observatory. From July 1st in 1884, tri-daily regular telegrams, viz, 6<sup>h</sup> am, 2<sup>h</sup> pm and 9<sup>h</sup> pm (that was changed to 10<sup>h</sup> pm on January 1st 1892), have been received at the Observatory from the Provincial Stations and tri-daily weathermaps (4 pages) published; storm warnings and weather predictions are all based on these data. On three pages out of four, isobars, isotherms, direction and force of wind, state of weather and warned districts are drawn, and readings of barometer, thermometer, wind direction, wind force, amount of precipitation, maximum and minimum temperature with changes for 24 hours and also foreign telegrams are tabulated in one page; in its bottom weather forecast for each meteorological district and storm warnings, if necessary, are inserted in abbreviated and legible form of language. These are the specimen of weathermaps and they explain the cyclonic storms visited our country in autumn and winter seasons. We intentionally selected them on September 14th and December 5th 1891, as they furnish themselves the most favourable examples.

## VIII. Report on the areas of low and high pressure

### in Japan, 1883-1890.

Commencement of simultaneous meteorological observations and publications of daily weathermaps in Japan were alike in 1883, accordingly the business relating to the investigation of our storms was inaugurated in that year. This report contains solely the results relating to the movements of low and high areas of pressure, experienced during eight years since 1883. It is classified to areas of low and high pressure, days of gales, days of heavy rains, verifications of indications and storm warnings, together with isobaric, isothermal and precipitation charts for monthly and annual means during that period. The following are the percentage of

mean verifications of indications and warnings experienced during eight years :—

Month	Indications of		Storm warnings
	Weather	Wind direction	
January	84	77	71
February	81	84	67
March	80	79	77
April	78	75	65
May	75	80	67
June	79	80	66
July	85	85	54
August	86	85	69
September	82	79	65
October	80	82	65
November	83	69	76
December	84	83	74
Mean	82	81	76

## IX. Charts showing seasonal distributions of air pressure and wind over Japan.

Although an earliest establishment of stations refers to the year 1872, the observations of a majority of stations now existing in Japan do not extend over ten years, therefore the corrections have been applied to them, by an interpolation comparing with adjacent stations experienced over ten years. The Charts are prepared by all these documents and adopting foreign observations such as at *Fusan*, *Jenchuan*, *Yuensan* in Corea, and at *Vladivostok* and *St. Olga* in Siberia. Other charts are also treated in the same manner. The Charts show seasonal distribution of air pressure and wind direction, the necessary corrections of pressure relating to altitude and gravity having been applied; wind directions given by percentage in eight points of compass, their mean directions being represented by arrows, number of calms by the size of a circle in the centre. Now we proceed to give some description of the Charts.

In winter, the high pressure area covers over the Asiatic Continent, north of Corea, and the low area lies over the Northern

Pacific Ocean. The isobaric lines run almost north and south, the barometrical range reaching as much as eight millimetres, thereby we experience in winter strong north to westerly winds frequently. But in summer, on the contrary the low area lies over the Continent and the high displays over the Pacific, the isobaric lines slightly inclining towards the northeast, the range being only two millimetres. Accordingly light south to easterly winds generally prevail in this season. In other two seasons—spring and autumn, it may be safely said that the distributions of pressure and direction of wind are as it were in midway between the changes in winter and summer.

The extreme readings of barometer and wind velocity noted since the beginning of this service are the following:—

Maximum air pressure 779.8 mm on February 2nd 1883, at *Nemuro* in Eastern *Hokkaido*.

Minimum air pressure 713.1 mm on September 14th, 1891, at *Nagasaki* in *Kiushu*.

Maximum wind velocity 43.2 m. p. s. October 10th, 1891, at *Settsu* in Western *Hokkaido*.

## **X. Charts showing seasonal distributions of air temperature and weather over Japan.**

The Charts are intended to show seasonal distributions of air temperature and weather. Temperature in centigrade degrees is represented by means of isothermal lines, and number of days of different kinds of weather by area of a circle drawn just on the position of a station; an area of outer circle proposed to denote whole number of days of weather in one season and divided into three sectors that are designed to illustrate respectively proportional number of clear, fair and cloudy days, and inner circle to point out proportional number of rainy days. A general meteorological feature to be learned from these Charts is epitomized at some length. In winter, the mean temperature ranges from  $18^{\circ}$  in *Bonin* Island to  $-7^{\circ}$  in Central *Hokkaido*, its difference  $25^{\circ}$ , and the isothermal lines run northerly almost along the coast, so that the

inland is colder in this season than the coast. In summer, the mean temperature is highest also in *Bonin* Island ( $27^{\circ}$ ), lowest at *Nemuro* ( $15^{\circ}$ ), the range being only  $12^{\circ}$ , and the isothermal lines flow in southerly direction along the coast that brings out the fact just opposite to winter, the inland warmer than the coast. The thermal condition of spring and autumn is to be considered as the intermediate status coming between winter and summer.

The extreme temperatures noted since the beginning of meteorological works in Japan are

Maximum temperature  $37.5^{\circ}\text{C}$  on August 19th, 1886, at *Hiroshima*, in the Inland Sea.

Minimum temperature  $-36.7^{\circ}$  on January 29th, 1891, at *Kamikawa* in Central *Hokkaido*.

As regards to the weather, in winter, we experience much rain or snow and least clear or fair days along the sea of Japan, while the occasion is reversed along the Pacific Coast; but, in summer, rainy days are most and fair least in Southern Japan; mostly fair weather enjoyed in Northern District.

## XI. Charts showing seasonal distributions of amount of precipitation.

The Charts show seasonal distributions of amount of precipitation. It has been prepared by comparing observations of each provincial station, with no less than one hundred and fifty lighthouses and rainfall stations. We will now give the gist of its distribution. We have abundant rain as compared with neighboring countries, the average fall at places of the Extreme South reaching 3 metres in the year. In winter there measured 400-800 mm along the Sea of Japan, only 100-300 mm on the south coast, but in summer we had 800-1,000 mm on the south coast while in the Inland Sea and Northern Japan the amount did not exceed over 200-400 mm.

The extreme amount of precipitation noted since the opening of meteorological services in Japan are:

Maximum amount for 24 hours, 900 mm on August 20th, 1889 at *Tanabe* in *Kii* peninsula.

Maximum amount for 4 hours, 177 mm on April 2nd 1891 at *Naha*, in *Liukiu*.

Maximum amount for 1 hour, 54 mm on December 28th, 1890 at *Kumamoto* in *Kiushu*.

## **XII. Charts showing frequency of Earthquakes in Japan, the great earthquakes of Kumamoto and Mino-Owari.**

The Chart shows annual frequency of earthquakes in Japan, prepared from the means of 6 years since 1885, the region covered by closed lines interpreting the most frequented places. This gives a general idea that the frequency of earthquakes is greater along the Pacific Coast, that is, from Southern *Kiushu* up to the east extremity of *Hokkaido*, than along the Sea of Japan, most conspicuous near *Tokio*, and the least frequency in *Tsushima*.

The violent shocks since the great earthquake of *Yedo* (November 11th 1855), have been as follows:—

On March 5th 1864, in the provinces of *Tamba* and *Harima*;

On March 14th 1872, in the province of *Iwami* and *Izumo*;

On July 28th, 1889 at *Kumamoto*;

On October 28th, 1891 in the province of *Mino* and *Owari*.

As the former two refer to the dates before the establishment of regular services, we are unable at present to trace any of their particulars, but with regard to the *Kumamoto* and *Mino-Owari* earthquakes, as we had an ample opportunity to investigate their occurrences, much time has been devoted to its researches, consequently many important data are now all at hand. Thereupon the separate charts have been prepared to show their intensities. The *Kumamoto* earthquake occurred at 11.<sup>h</sup>40<sup>m</sup> pm on July 28th 1891, and extended to the western extremity of *Honshu* (Nippon) in east, the area calculated approximately 10,000 square kilometres, wherein 1,500 square kilometres have been the parts violently shaken, destroying 400 dwellings, killing 20 persons, injuring 74. Near the epicentric region the earth crust produced many cracks, from which sand and mud have been emitted; the largest splits reaching the length of 1,300 metres, the breadth 6 metres. After this great earthquake,

the people have experienced many successive shocks, amongst which on July 29th and 30th, numbers noted were 62.

The occurrence of the *Mino-Owari* earthquake was at 6<sup>h</sup> 38<sup>m</sup> am on October 28th 1891. Its area was nearly 240,000 square kilometres, comprising *Gifu* in the epicentre; the region extended from *Owari* Bay in the Pacific Ocean to *Tsuruga* Bay in the Sea of Japan has been the most seriously damaged which are assuredly told to have been the greatest distress during past 40 years. The most violent shocks covers the area of about 1,000 square kilometres; indeed within this space grounds sunk in, mountains destroyed, dwellings upset, rails damaged, bridges fell down, were innumerable. Their important figures are summed up thus :

Death 7,273; Injured 17,175; Houses destroyed 142,177; Houses partially destroyed 80,324; Bridges fell down 10,392.

During several months, this great earthquake has been followed by incessant shocks in the district severely shaken, a certain occasion bringing several hundreds in a day. Even now after 15 months elapsed from the occurrence, we are experiencing 2 or 3 times every day.

### XIII. The Climate of Japan.

This volume embodies the results of all kinds of observations taken at each station since the inauguration of our official meteorological services and discusses fully about our climate and the changes of meteorological elements. The different headings of this volume are as follows:—

INTRODUCTION.—General geographical description of Japan.

CHAPTER I.—Air Temperature :

Diurnal and annual variations and its distribution over Japan, extremes, ranges and miscellaneous.

CHAPTER II.—Atmospheric pressure :

Diurnal and annual variations, extremes and its distribution over Japan.

CHAPTER III.—Wind :

Diurnal and annual variations, maximum velocity and frequency.

## CHAPTER IV.—Humidity :

Diurnal and annual variations and extremes.

## CHAPTER V.—Cloud amount :

Diurnal and annual variations, number of clear and cloudy days and sunshine.

## CHAPTER VI.—Precipitation :

Diurnal and annual variations, heavy rain, frequency and its distribution over Japan.

## CHAPTER VII.—Conclusion :

Mutual relations of meteorological elements and their nature of changes.

All the essays in each chapter are illustrated by exquisite and perfect diagrams or charts annexed.

#### XIV. Report on high level meteorological observations in Japan, 1880-1891.

Since the year 1880, the high level meteorological observations have been made during the periods of some days or over several months, by the officials of our Observatory or by our other meteorologists, was just 6 times. This report contains all the results of observations made on high mountains compared with those of lower stations, and some differences of the meteorological elements between the upper and lower air strata.

The selected high level stations during expeditions are

High Station :	Altitude :	Period of Observations.	
Fuji	3,718 m.	August,	1883
		September,	1887
		August,	1889
Ontake	3,062 m.	August,	1891
Gozaishodake	1,200 m.	September,	1888
Yamanaka	990 m.	August,	1889
Kurosawa	832 m.	August,	1891
Higashi Hoben	736 m.	August-October	1889

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# LIST OF JAPANESE METEOROLOGICAL PUBLICATIONS.

## **Reports of Meteorological Stations:**

Monthly and Annual means of observations made at 9<sup>h</sup>30<sup>m</sup> am, 3<sup>h</sup>30<sup>m</sup> pm and 9<sup>h</sup>30<sup>m</sup> pm from 1874 to 1882; at 6<sup>h</sup> am, 2<sup>h</sup> pm and 10<sup>h</sup> pm from 1883 to 1885; at 2<sup>h</sup>, 6<sup>h</sup> and 10<sup>h</sup> am, pm from 1886 to 1891.

## **Reports of Meteorological Observations at Tokio:**

For the lustrum 1876-1880 and for the ten years 1876-1885.

## **Reports of Hourly Meteorological Observations at Tokio:**

For the lustrum 1886-1890.

## **Annual Reports of Hourly Meteorological Observations at Tokio:**

For the years 1886-1891.

## **Monthly Reports of Hourly Meteorological Observations at Tokio:**

For the years 1890-1892.

## **Monthly Summaries:**

Tracks of low and high pressure, isobars, isotherms, rainfall, storms, etc, for the years 1883-1890.

## **Tridaily Weathermaps:**

Daily reports, remarks, indications for the years 1883-1892.

## **Miscellaneous Publications:**

Instructions to meteorological observers (1880)—Additional Instructions to meteorological observers (1882)—Instructions for meteorological observations (1886)—Reports of the Seismometrical observations for the years 1885-1890—Reports of the Pluviometric observations for the years 1890-1891—Some researches on the Agricultural Meteorology—Regulations on the Meteorological Telegrams—Regulations on the Meteorological Signals—Reports of the Expeditions to Mount Fuji (1888 and 1889), to Mount Gozaishodake (1888), to Mount Ontake (1891)—Organisation du Service météorologique au Japon (1889)—Low Barometer in Japan (1890).

A  
DESCRIPTIVE CATALOGUE  
OF  
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PARTICULAR DESCRIPTION  
OF  
JAPANESE FORAGE PLANTS.

---

- A.* Duration of growth.
  - B.* Height.
  - C.* Flowering time.
  - D.* Seed ripening time.
  - E.* Times of cutting during a season.
  - F.* Produce per acre.
  - G.* Percentage composition.
  - H.* Locality where particularly found.
  - I.* Miscellaneous record.
-

## 1. NAGAHAGUSA (*POA PRATENSIS*, L.) GRAMINEAE.

### DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.

Flower, parts of ..... enlarged.

Seed ..... enlarged.

A. Perennial.

B. 1.5—2 feet.

C. Beginning of May—middle of the month.

D. Latter part of May—beginning of June.

E. 2 or 3 times.

F. Total 9,180—12,920 lbs. green.  
3,060—5,100 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 80.80

Hay contains—

Water	11.20
Ash	11.50
Phosphoric acid	0.45
Potash	1.94
Crude protein	18.13
Crude fibre	22.79
Nitrogen free extract	33.12
Crude fat	3.26

H. Moist soil and grows well under trees and among other grasses.

I. It is propagated both by seed and by transplanting, and its creeping nature makes it well suited for pasturage. The hay is very fine and of rich colour.

## 2. ICHIGO-TSUNAGI (*POA ANNUA*, L.) GRAMINEAE.

### DRAWING :—

Plant .....  $\frac{2}{3}$  of natural size.

Flower, parts of ..... enlarged.

Seed..... enlarged.

A. Biennial.

B. 1.5—2 feet.

C. Latter part of April—beginning of May.

D. Middle of May—latter part of the month.



F. Not fully known.

G. In flower.

Water lost by changing into hay per cent 83.76

Hay contains—

Water	11.06
Ash	10.42
Phosphoric acid	0.30
Potash	1.71
Crude protein	12.81
Crude fibre	21.80
Nitrogen free extract	39.81
Crude fat	4.10

H. Wet places, particularly along the road.

I. This is one of the grasses, which grow very early in the Spring and is cut up with other grasses : it is suited to pasturage.

### 3. ZARATSUKI-ICHIGOTSUNAGI (*POA SPHONDYLODES*, TRIN.) GRAMINEAE.

DRAWING :—

Plant .....  $\frac{1}{2}$  of natural size.

Flower, parts of ..... enlarged.

Seed ..... enlarged.

A. Perennial.

B. 1.5—2 feet.

C. Latter part of May—beginning of June.

D. Middle of June—latter part of the month.

E. 2 times.

F. Total 6,800—8,840 lbs. green.

2,380—3,060 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 85.36

Hay contains—

Water	14.49
Ash	9.42
Phosphoric acid	0.25
Potash	1.25
Crude protein	19.48
Crude fibre	

Nitrogen free extract	35.25
Crude fat	4.22

H. Dry land and sandy bed of a river, which is dry except at high water ; as that of 'Tamagawa.'

I. The whole plant is rough to the touch, and dries quickly, but its aftermath is not fertile. Commonly cut with other grasses.

#### 4. DOJIŌ-TSUNAGI (*GLYCERIA CASPIA*, TRIN.) GRAMINEAE.

DRAWING :—

Plant .....  $\frac{1}{2}$  of natural size.

Flower, parts of ..... enlarged.

Seed ..... enlarged.

A. Perennial.

B. 1.5—2 feet.

C. Latter part of April—beginning of May.

D. Middle of May—latter part of the month.

E. 2 times.

F. Not fully known.

G. In flower.

Water lost by changing into hay per cent 80.58

Hay contains—

Water	10.70
Ash	11.88
Phosphoric acid	0.32
Potash	1.64
Crude protein	17.57
Crude fibre	19.44
Nitrogen free extract	35.43
Crude fat	4.98

H. Grows largely on the banks of furrows, ditches and ridges of paddy fields, but not found in dry land.

I. Commonly cut with other grasses.

#### 5. SUDZUMENO-CHAHIKI SP. (*BROMUS* SP.) GRAMINEAE.

DRAWING :—

Plant .....  $\frac{1}{2}$  of natural size.

Flower, parts of ..... enlarged.

..... enlarged.

- A. Perennial.  
 B. 3—4 feet.  
 C. Latter part of May—beginning of June.  
 D. Beginning of June—middle of the month.  
 E. 3 times.  
 F. Total 18,700—29,920 lbs. green.  
     5,780—8,500 lbs. hay.  
 G. In flower.  
     Water lost by changing into hay per cent 68.78  
     Hay contains—  
         Water 7.38  
         Ash 19.64  
         Phosphoric acid 1.41  
         Potash 9.32  
         Crude protein 21.06  
         Crude fibre 23.42  
         Nitrogen free extract 24.20  
         Crude fat 4.30

H. Not very common, but may be grown in any soil and place.

I. Quick growth, large produce, easy cultivation, and green through the Winter are its advantages. As green fodder is very tender and sweet, but as hay rather rough.

## 6. KANITSURIGUSA (*TRisetum CERNUUM*, TRIN.) GRAMINEAE.

DRAWING:—

Plant .....  $\frac{1}{2}$  of natural size.  
 Flower, parts of ..... enlarged.  
 Seed ..... enlarged.

- A. Perennial.  
 B. 1.5—2.5 feet.  
 C. Beginning of May—latter part of the month.  
 D. Beginning of June—middle of the month.  
 E. 2 times.  
 F. Total 8,500—10,200 lbs. green.  
     2,720—3,400 lbs. hay.  
 G. In flower.  
     Water lost by changing into hay per cent 29.22  
     Hay contains—

Water	12.96
Ash	8.88
Phosphoric acid	0.63
Potash	2.77
Crude protein	15.24
Crude fibre	21.15
Nitrogen free extract	35.60
Crude fat	6.17

H. Shady places, river banks, and any moist soils, but comparatively rare in dry soil.

I. Commonly cut with other grasses.

## 7. KITSUNE-GAYA (*FESTUCA REMOTIFLORA*, STEUD.) GRAMINEAE.

### DRAWING :—

Plant .....  $\frac{1}{2}$  of natural size.

Flower, parts of ..... enlarged.

Seed ..... enlarged.

A. Perennial.

B. 3—4 feet.

C. Beginning of July—middle of the month.

D. Beginning of August—middle of the month.

E. 2 times.

F. Total 11,900—27,200 lbs. green.

3,740—8,500 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 64.82

Hay contains—

Water	9.22
Ash	9.40
Phosphoric acid	0.77
Potash	1.98
Crude protein	10.66
Crude fibre	32.29
Nitrogen free extract	36.41
Crude fat	2.62

H. Shady place such as woods, fences, etc.

I. Commonly cut with other grasses. Its chief advantage is the time, in  
er the wet season.

# 8. TOBOSHIGARA (*FESTUCA PARVIGLUMA*, STEUD.) GRAMINEAE.

## DRAWING :—

Plant ..... sparingly contracted.  
 Flower, parts of ..... enlarged.  
 Seed ..... enlarged.

- A. Perennial.
- B. 1.5—2 feet.
- C. Middle of May—latter part of the month.
- D. Latter part of May—beginning of June.
- E. 2 times.
- F. Not fully known.
- G. In flower.

Water lost by changing into hay per cent 73.50

Hay contains—

Water	11.44
Ash	9.17
Phosphoric acid	0.55
Potash	2.37
Crude protein	10.01
Crude fibre	23.51
Nitrogen free extract	41.17
Crude fat	4.70

- H. Most abundant under trees or in moist places.
- I. Commonly cut with other grasses.

# 9. MINOGOME (*BECKMANNIA ERUCOEFORMIS*, HOST.) GRAMINEAE.

## DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.  
 Flower, parts of..... enlarged.  
 Seed ..... enlarged.

- A. Biennial.
- B. 1.5—2 feet.
- C. Latter part of April—beginning of May.
- D. Middle of May—latter part of the month.
- E. 2 times.

F. Not fully known.

G. In flower.

Water lost by changing into hay per cent 80.57

Hay contains—

Water	18.38
Ash	12.28
Phosphoric acid	0.55
Potash	2.63
Crude protein	21.49
Crude fibre	18.59
Nitrogen free extract	30.31
Crude fat	3.95

H. Dry paddy fields before the cultivation of rice plant.

I. Although this plant originally grows in the above description of land, it may also be produced in dry soil. In paddy fields the seeds ripen before the surface soil has to be cultivated for the rice plant, so it grows year after year, never failing.

## 10. NO-BIE (*PANICUM CRUS-GALLI*, L.) GRAMINEAE.

DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.

Flower, parts of..... enlarged.

Seed ..... enlarged.

A. Annual.

B. 2—3 feet.

C. Latter part of July—beginning of August.

D. Latter part of August—beginning of September.

E. One time.

F. Not fully known.

G. In flower.

Water lost by changing into hay per cent 79.32

Hay contains—

Water	10.39
Ash	14.12
Phosphoric acid	0.63
Potash	5.11
Crude protein	16.75
Crude fibre	25.89

Nitrogen free extract	28.27
Crude fat	4.58

H. Any soil and place.

I. This plant germinates in the beginning of Summer and grows with great rapidity. It is among the most nutritious of fodder in the green as well as dry state.

# 11. HIE (*PANICUM FRUMENTACEUM*, ROXB.) GRAMINEAE.

## DRAWING :—

Plant.....	$\frac{1}{2}$ of natural size.
Flower, parts of.....	enlarged.
Seed .....	enlarged.

A. Annual.

B. 5—6 feet.

C. Beginning of August—middle of the month.

D. Beginning of September—middle of the month.

E. One time or more when cut young.

F. 23,800—27,200 lbs. green.

5,100—6,800 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 75.88

Hay contains—

Water	16.00
Ash	7.5
Phosphoric acid	0.25
Potash	1.12
Crude protein	9.3
Crude fibre	27.2
Nitrogen free extract	38.4
Crude fat	2.4

H. Any soil.

I. This is the cultivated fodder plant of Japan and its seeds are used as food for lower class of men in the cold high mountainous districts and northern climate, where the rice plant is not profitably cultivated.

**12. KE-MEHISHIBA** (*PANICUM SANGUINALE*, L. VAR.  
*CILIARE*, GREN ET GODR.) GRAMINEAE.

DRAWING :—

Plant.....  $\frac{3}{4}$  of natural size.  
Flowers, parts of ..... enlarged.  
Seed ..... enlarged.

- A. Annual.  
B. 2—3 feet.  
C. Latter part of July—beginning of August.  
D. Latter part of August—beginning of September.  
E. Several times.  
F. Not fully known.  
G. In flower.

Water lost by changing into hay per cent 82.08

Hay contains—

Water	9.30
Ash	11.18
Phosphoric acid	0.56
Potash	3.22
Crude protein	11.81
Crude fibre	27.59
Nitrogen free extract	36.71
Crude fat	3.41

H. Most abundant in the uncultivated fields and by the roadside, but not found on a mountain or wild plain.

I. This kind of grass is mostly seen in Summer and Autumn. That in this country hay cut before the month of June (wet season) can not be well preserved must be borne in mind in selecting meadow grasses.

**13. HONAGAREGUSA** (*SETARIA EXCURRENS*, MIQ.)  
GRAMINEAE.

DRAWING :—

Plant.....  $\frac{3}{4}$  of natural size.  
Flower, parts of..... enlarged.  
..... enlarged.





Hay contains—

Water	9.01
Ash	8.24
Phosphoric acid	0.41
Potash	2.42
Crude protein	9.69 *
Crude fibre	29.63
Nitrogen free extract	40.91
Crude fat'	2.52

*H.* Almost anywhere, but does best in moist soil and commonly is met with in the dykes of rivers, ditches, etc.

*I.* Very strong plant and may be propagated by planting the roots cut into pieces, 5 or 6 inches long. It grows year after year with a little care and gives abundant crops, but it becomes coarse and hard unless it is cut before blossoming.

## 15. BAREN-SHIBA (*ARUNDINELLA ANOMALA*, STEUD.) GRAMINEAE.

DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.  
Flower, parts of..... enlarged.  
Seed ..... enlarged.

*A.* Perennial.

*B.* 4—5 feet.

*C.* Middle of September—latter part of the month.

*D.* Middle of October—latter part of the month.

*E.* 2 times.

*F.* Total 19,380—34,000 lbs. green.

5,100—10,200 lbs. hay.

*G.* In flower.

Water lost by changing into hay per cent 62.38

Hay contains—

Water	10.26
Ash	11.14
Phosphoric acid	0.54
Potash	3.15
Crude protein	9.68

Crude fibre	34.09
Nitrogen free extract	32.86
Crude fat	1.97

H. Plains, woods, dykes, ridges of paddy fields all over the country and chiefly on hill sides covered with Susuki (*Eularia Japonica*), which is used as roofing in country houses.

I. It sprouts late in the Spring and grows vigorously during the Summer, occupying a great deal of land because of its creeping underground stem. It becomes very hard if cutting is postponed to the time of blossoming.

## 16. YAHADZU-YENDŌ (*VICIA SATIVA*, L.) LEGUMINOSAE.

DRAWING :—

Plant.....	natural size.
Flower, parts of.....	enlarged.
Legume .....	natural size.
Seed .....	natural size.

- A. Biennial.
- B. 3—4 feet.
- C. Latter part of April—beginning of May.
- D. Latter part of May—beginning of June.
- E. One time.
- F. Not fully known.
- G. In flower.

Water lost by changing into hay per cent 83.00  
Hay contains—

Water	9.04
Ash	8.68
Phosphoric acid	0.91
Potash	3.11
Crude protein	24.48
Crude fibre.	20.98
Nitrogen free extract	33.09
Crude fat	3.73

H. Commonly met with in the ridges of paddy fields, where it is cut with other legumes and grasses for soiling purpose.

I. This is not suited for hay. Early growth in Spring is of no advantage,

**17. KUSA-FUJI** (*VICIA CRACCA*, L. *VAR JAPONICA*, MIQ.)  
**LEGUMINOSAE.**

DRAWING :—

Plant.....	natural size.
Flower, parts of.....	enlarged.
Legume .....	enlarged.
Seed .....	enlarged.

- A. Perennial.  
B. 5—6 feet or more in advantageous circumstances.  
C. Middle of June—latter part of the month.  
D. Middle of September—latter part of the month.  
E. 2 times.  
F. Not fully known.  
G. In flower.

Water lost by changing into hay per cent    79.02

Hay contains—

Water	9.06
Ash	9.12
Phosphoric acid	0.58
Potash	3.48
Crude protein	24.00
Crude fibre	25.43
Nitrogen free extract	31.53
Crude fat	0.86

H. Grows in groves or in waste ground dividing the fields in different parts of the country.

I. When cultivated alone it is liable to lie on the ground and the lower parts become more or less damaged imparting an unpleasant odor to the fodder. The seeds scarcely ripen, but it is easily propagated by its roots, which spread rapidly.

**18. ŌBA-KUSAFUJI** (*VICIA PSEUDO-OROBUS*, FISCH ET MEY.)  
**LEGUMINOSAE.**

DRAWING :—

Plant .....	natural size.
Flower, parts of .....	enlarged.
Legume .....	natural size.
.....	natural size.

- A. Perennial.
- B. 5—6 feet or more in favourable circumstances.
- C. Middle of July—beginning of September.
- D. Latter part of September—beginning of November.
- E. 2 times.
- F. Not fully known.
- G. In flower.

Water lost by changing into hay per cent 78.00

Hay contains—

Water	10.36
Ash	6.60
Phosphoric acid	0.60
Potash	2.52
Crude protein	20.16
Crude fibre	21.38
Nitrogen free extract	37.65
Crude fat	3.95

II. Grows in groves or in waste ground dividing fields.

I. When cultivated alone is liable to lie on the ground and the lower parts become more or less damaged imparting an unpleasant odor to the fodder. Seeds rarely mature, but it is easily propagated by the roots, which are of the same nature as No. 17.

## 19. FUTABA-HAGI (*VICIA UNIJUGA*, AL. BR.) LEGUMINOSAE.

DRAWING :—

Plant..... natural size.  
 Flower, parts of..... enlarged.  
 Legume ..... natural size.  
 Seed ..... enlarged.

- A. Perennial.
- B. 2—5.2 feet.
- C. Beginning of June—middle of the month.
- D. Latter part of September—latter part of October.
- E. 2 or 3 times.
- F. Not fully known.
- G. A month before blossoming.

Water lost by changing into hay per cent 78.95

Hay contains—

Water	12.76
Ash	7.36
Phosphoric acid	1.15
Potash	2.47
Crude protein	26.81
Crude fibre	29.66
Nitrogen free extract	20.97
Crude fat	2.44

H. Plains, dykes of rivers ; commonly dry deep soils.

I. Grows in large patches ; good for soiling ; cattle relish it very much.

## 20. MUMAGOYASHI (*MEDICAGO DENTICULATA*, WILLD.) LEGUMINOSAE.

DRAWING :—

Plant .....	natural size.
Flower, parts of .....	enlarged.
Legume .....	enlarged.
Seed .....	enlarged.

A. Biennial.

B. 1—2 feet.

C. Latter part of April—beginning of May.

D. Beginning of June—middle of the month.

E. Several times.

F. Not fully known.

G. In flower.

Water lost by changing into hay per cent 85.36

Hay contains—

Water	15.76
Ash	10.24
Phosphoric acid	0.47
Potash	1.22
Crude protein	24.74
Crude fibre	16.80
Nitrogen free extract	29.12
Crude fat	3.34

H. Much found on the ridges of paddy fields, river banks, etc. Clayey soil is most suitable for it

I. Germinates about the middle of September ; it grows during the Winter  
and is used as fodder early in Spring.

## 21. RENGESŌ (*ASTRAGALUS LOTOIDES*, LAM.) LEGUMINOSAE.

### DRAWING :—

Plant .....	natural size.
Flower, parts of .....	enlarged.
Legume .....	natural size.
Seed.....	enlarged.

A. Biennial.

B. Common kind is a small procumbent plant: that of Shiga prefecture and Gifu prefecture cultivated on paddy fields for the purpose of green manure, grows vigorously sometimes as high as 4 feet or even more.

C. Latter part of April—beginning of June.

D. Latter part of May—middle of June.

E. One time.

F. 15,000—18,000 lbs. green.

3,800—4,500 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 89.46

Hay contains—

Water	13.80
Ash	10.44
Phosphoric acid	0.46
Potash	2.06
Crude protein	19.96
Crude fibre	15.12
Nitrogen free extract	36.10
Crude fat	4.58

H. Particularly in paddy fields of rich soil and perfectly dry after the harvest of the rice plant. In such soil it is seen throughout the country.

I. As green fodder it is much relished by cattle, but it is not safe to give it alone in large quantities without the addition of some dry food, because it is so succulent as to produce a diarrhetic effect.

## 22. SHINAGAWA-HAGI (*MELILOTUS ARVENSIS*, WALL.) LEGUMINOSAE.

### DRAWING :—

Plant .....	natural size
Flower, parts of .....	

Legume ..... enlarged.  
Seed ..... enlarged.

- A. Biennial.  
B. 3—6 feet.  
C. Beginning of July—latter part of the month.  
D. Middle of August—beginning of October.  
E. Several times when cut in young stage.  
F. 13,600—27,200 green.  
G. About one foot high.  
Water lost by changing into hay per cent 77.00  
Hay contains—  
Water 14.02  
Ash 14.22  
Phosphoric acid 0.38  
Potash 1.25  
Crude protein 23.25  
Crude fibre 16.10  
Nitrogen free extract 22.51  
Crude fat 9.90

H. Not very common: light soil in warm place.

I. The leaves of this plant when dry emit an agreeable odor. In blossom the stem is rather woody and is not suitable a food for animals.

## 23. YAHADZUSŌ (*LESPEDEZA STRIATA*, HOOK ET ARN.)

### LEGUMINOSAE.

#### DRAWING :—

Plant ..... natural size.  
Flower, parts of ..... enlarged.  
Legume ..... enlarged.  
Seed ..... enlarged.

- A. Annual.  
B. Dwarf plant, but its branches grow from 18 inches to 2 feet resting on the ground when alone and somewhat raised when with others.  
C. Latter part of August—middle of September.  
D. Latter part of October—beginning of November.



F. 11,560—12,240 lbs.g reen.

3,060—3,740 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 68.00

Hay contains—

Water	11.86
Ash	5.45
Phosphoric acid	0.36
Potash	1.19
Crude protein	15.44
Crude fibre	26.29
Nitrogen free extract	36.53
Crude fat	4.43

H. Its extent is very wide being met with from the north of Hokkaidō to the south of Kiushu and from the plain up to the mountain, but especially along the way side.

I. Five years ago the Queenceland government made a request to our government for 50 lbs. of the seeds of the plant through the English minister ; until that day its cultivation had been regarded only as an experiment of the Agricultural Bureau made on a small scale. Accordingly so many plants as were needed to produce the seeds were collected in the vicinity of the city of Tōkiō and transplanted. Thus plenty seed were obtained and presented to the one who requested them. From that time its name has become familiar among practical men and the experiment has been repeated at different places.

When it is cut at the proper time the leaves are not much shaken off and so is not like other leguminosae and dries quickly—great advantage for this country, the climate of which is very changeable. The hay is very fine : horses and cattle fond of it.

## 24. MARUBA-YAHADZUSŌ (*LESPEDEZA STRIATA*, HOOK ET ARN. VAR.) LEGUMINOSAE.

DRAWING :—

Plant.....	natural size.
Flower, parts of .....	enlarged.
Legume ..	enlarged.
Seed.....	enlarged.

A. Annual.

B. General appearance is much

somewhat different shaped ones surround the flowers. The length of branches is from 2 feet to 2.5 feet.

C. Beginning of September—end of the month.

D. Latter part of October—beginning of November.

E. One time.

F. 12,920—18,600 lbs. green.

3,400—3,740 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 77.00

Hay contains—

Water	13.87
Ash	4.63
Crude protein	12.26
Crude fibre	32.08
Nitrogen free extract	34.76
Crude fat	2.40

H. Almost same as No. 23, but far less in number.

I. It was accidentally found among No. 23 when the latter had been cultivated in order to send the seed to Queenceland. In the first stage both are alike in appearance, but the variation becomes more and more marked as it grows.

## 25. HAGI (*LESPEDEZA BICOLOR*, TURCZ. VAR.) LEGUMINOSAE.

### DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.

Flower, parts of..... enlarged.

Legume ..... enlarged.

Seed ..... enlarged.

A. Perennial.

B. 5—6 feet.

C. Latter part of August—middle of September.

D. Middle of November—latter part of the month.

E. Same as No. 26.

F. Not fully known, but at least the amount of No. 26 from the consideration of general features.

G. Not yet analysed.

H. Deep soil.

I. This is the cultivated white flowered lespedeza and is not found in wild

and keeps green later in the fall than No. 26.

Florists as well as individuals cultivate this plant much for its graceful appearance and count it among the seven flowers of Autumn.

## 26. NO-HAGI (*LESPEDeza BICOLOR*, TURCZ.) LEGUMINOSAE.

DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.  
 Flower, parts of ..... enlarged.  
 Legume ..... enlarged.  
 Seed ..... enlarged.

A. Perennial.

B. 6—7 feet.

C. Latter part of August—middle of September.

D. Beginning of November—middle of the month.

E. In common practice only once, but it may be cut as often as 3 times as shown by an experiment made in the Imperial College of Agriculture and Dendrology.

F. Total. 24,780—25,580 lbs. green.

6,780—8,300 lbs. hay.

G. In flower.

Water lost by changing into hay per cent 70.00

Hay contains—

Water	16.0
Ash	5.9
Phosphoric acid	0.51
Potash	1.01
Crude protein	14.7
Crude fibre	28.9
Nitrogen free extract	30.8
Crude fat	3.7

H. Deep dry soil throughout the country and particularly abundant in hilly districts.

I. This is noted as a fodder plant in Japan, lately also known to foreign countries, and has been abundantly used from immemorial time by stock owners in different districts. When properly dried it makes a good sweet hay, which is excellent for horses and cattle. This species also is cultivated by the florist,

# 27. KARIMAME (*GLYCINE HISPIDA*, MOENCH.) LEGUMINOSAE.

## DRAWING :—

Plant .....	$\frac{1}{2}$ of natural size.
Flower, parts of .....	enlarged.
Legume.....	natural size.
Seed .....	natural size.

- A. Annual.
- B. 4—5 feet.
- C. Middle of August—latter part of the month.
- D. Middle of October—latter part of the month.
- E. One time.
- F. 2,500—3,740 lbs. hay.
- G. In flower.

Water lost by changing into hay per cent    75.6

Hay contains—

Water	16.00
Ash	5.9
Phosphoric acid	0.36
Potash	3.13
Crude protein	16.9
Crude fibre	35.9
Nitrogen free extract	23.1
Crude fat	2.2

H. Best suited in northern climates and may be grown in almost any kind of soil but particularly suited to soil of a strong character.

I. This is one of the fodder plants under cultivation in Japan. Formerly its cultivation was far more extensive, being used to feed riding horses of the higher classes subject to Tokugawa and some of the princes called “Daimiō”; but now it is limited to the northern district—say Iwate prefecture, Awomori prefecture and some others.

All live stock fond of it and horses eat it greedily. It is said by some practical men that when Karimame is given to horses out of order, their health will sooner or later be restored. Another advantage of this fodder plant is the short time in which it comes to maturity or is fitted to be cut and made into hay, that is, when sown at the end of May it is fit to be cut in the beginning of August: it is conveniently added to the rotation of crops and it leaves the ground clean

The hay has a pretty green color and a

pleasant odor, but its dry leaves are very liable to break, so it requires to be treated with great precaution at the time of hay making.

## 28. KUDZU (*PUERARIA THUNBERGIANA*, BENTH.) LEGUMINOSAE.

### DRAWING :—

Plant.....	$\frac{1}{2}$ of natural size.
Root .....	$\frac{1}{3}$ of natural size.
Flower, parts of.....	enlarged.
Legume .....	natural size.
Seed .....	enlarged.

A. Perennial.

B. The vine reaches the length of 10—20 feet or upward.

C. Latter part of August—middle of September.

D. Latter part of October—middle of November.

E. Several times when only upper part is cut.

F. 17,000—23,800 lbs. green.

4,420—6,800 lbs. hay.

G. Vines and leaves together.

Water lost by changing into hay per cent 74.0

Hay contains—

Water	16.0
Ash	8.3
Phosphoric acid	0.6
Potash	1.24
Crude protein	15.8
Crude fibre	27.5
Nitrogen free extract	29.1
Crude fat	3.3

H. Most abundant in mountainous district, where it grows twinning round the trees, but it is met with in neglected land all over the country. Province Tajima noted for raising excellent cattle is particularly favoured with this fodder plant.

I. In breeding districts farmers cut the leaves and stems together during the Summer and preserve it after drying for Winter feed. This plant has large long fasciculated roots rich in starch which are dug for the sake of it,

**29. NUSUBITO-HAGI (*DESMODIUM PODOCARPUM*, DC.)**  
**LEGUMINOSAE.**

DRAWING :—

Plant.....  $\frac{1}{2}$  of natural size.  
Flower, parts of..... enlarged.  
Legume ..... natural size.  
Seed ..... natural size.

- A. Perennial.  
B. 2.5—3 feet.  
C. Beginning of August—middle of the month.  
D. Latter part of October—beginning of November.  
E. One time.  
F. Not fully known.  
G. before blossom.  
Water lost by changing into hay per cent 72.51  
Hay contains—  
    Water 13.08  
    Ash 5.58  
    Phosphoric acid 0.75  
    Potash 1.71  
    Crude protein— 16.94  
    Crude fibre 30.36  
    Nitrogen free extract 30.40  
    Crude fat 3.64  
H. Shady and somewhat moist soil.

**30. KOMATSUNAGI (*INDIGOFERA TINCTORIA*, L.) LEGUMINOSAE.**

DRAWING :—

Plant..... natural size.  
Flower, parts of..... enlarged.  
Legume ..... natural size.  
Seed ..... natural size.

- A. Perennial.  
B. 3—5 feet.  
C. Beginning of August.

*D.* Beginning of November—middle of the month.

*E.* 3 times.

*F.* Total 34,000—37,400 lbs. green.

*G.* Before blossom.

Water lost by changing into hay per cent 72.3

Hay contains—

Water	11.19
Ash	7.37
Phosphoric acid	0.24
Potash	1.75
Crude protein	11.40
Crude fibre	30.60
Nitrogen free extract	35.66
Crude fat	3.79

*H.* Most abundant in waste plains but its extent is very wide even growing high upon the mountains.

*I.* This plant particularly fit as green fodder when dry almost all the leaves fall off leaving only branches.









A  
BRIEF DESCRIPTION  
OF THE  
TAXIDERMIC SPECIMENS  
OF  
OHIKI, SHAMO AND CHABO.  
EXHIBITED IN THE  
WORLD'S COLUMBIAN EXPOSITION  
PUBLISHED BY  
THE AGRICULTURAL BUREAU  
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J A P A N .

---

1893.



## OHIKI.

### (JAPANESE LONG-TAILED FOWL.)

The long-tailed fowls are only bred in Shinowara mura, Nagaoka county, Tosa province. During the time of Tokugawa dynasty, the breeding of these fowls was much encouraged by the government of the feudal lord (Yamanouchi) and their tail feathers were taken in payment of local taxes, being used to adorn the lord's spears and the birds and feathers were not allowed to be exported. During this time the breeding, feeding and management of the fowls, attained a high degree of perfection.

Owing to the difference of their color, voice and appearance, they are classified into various breeds, for example Shirafuji, Shinowarato, Tōtenkō, &c. As their feeding and management are very difficult and their price is not very cheap they are only kept as curiosities or pets. The cock and hen exhibited here, belong to the Shirafuji breed and are four years old. They were hatched at the farm belonging to a farmer called T. Kinzō in Satokaidamura, Nagaoka county, Tosa province. Their tails measure 10 feet and 6 inches. The single black cock belongs to the Shinowarato. It is two years old and was hatched at the farm belonging to K. Nagayoshi in the city of Kōchi, Tosa province. The length of the tail is 5 feet. The tail will probably attain the length of 10 feet in two years' time.

## SHAMO.

### (MALAY OR SIAMESE GAME.)

It is largely used as food, because its flesh is very delicious. It is also kept as a game fowl, and a good one commands a price of from twenty to thirty yen. The following points are the characteristics of the Shamo as a game fowl.

1. It is large and active.
  2. Its feathers are lustrous and very thick.
  3. Its body is erect and the muscles of the thighs, are strong and well developed.
  4. It is not discouraged before a stronger enemy and fights until it is dead.
- The Shamo which have the above characteristics in the highest perfection are

The cock Shamo exhibited here is about two years old, having been hatched in February 1891. The male weighs 9.94 pounds and the female 6.63 pounds. They are able to endure severe cold and heat and the male has all the characteristics mentioned above. In fighting he is wonderfully quick and has never been defeated yet.

## CHABO.

(JAPANESE BANTAM.)

The pure breed is only kept in Japan. It is a quiet and peaceful fowl, and is supposed to announce the hour exactly. The male and female live together in perfect harmony. Though its flesh can be used as food, it is mostly kept as a domestic pet.

In color of plumage, some of them are quite white, some are half white and half black, and some are white having black tails. According to the color and shape of their bodies, they are separated into different breeds. Excellent ones are very highly valued.

The one exhibited here white with a black tail belongs to the breed called Katsura. It is two years old having been hatched in March 1891. The white one belongs to the breed called Haku (white). It is also two years old, having been hatched in March 1891. In the city of Tōkyō the breeders assemble frequently to exhibit their Chabo and to compare their qualities. Such a meeting is called Chabo-hinpyō Kwai (the show of the Chabo.) The pair of the Katsura breed exhibited here had the honour of being the best in the first rank in the show which was held at Uyeno park in the city of Tōkyō in December 1892. The one of the Haku breed had the third rank in the same show and was the best one among the pure white breeds.

The cages in which the Obiki, Shamo and Chabo, are kept are those commonly used in Japan for feeding.

[These taxidermic specimens were prepared by Kyōikuhin-seizō-Kwaisha (educational appliances manufacturing, Co.) No. 2 Shichikenchō Asakusa, Tōkyō.]





A  
BRIEF DESCRIPTION  
OF THE  
FIGURES OF THE JAPANESE  
HORSES AND CATTLE  
EXHIBITED IN THE  
WORLD'S COLUMBIAN EXPOSITION  
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J A P A N .

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## JAPANESE HORSES.

The principal breeding districts of horses in Japan are those of Nanbu and Sendai. The district of Naubu extends across the prefectures of Awomori and Iwate. The most noted place in the district of Sendai is Onikobemura in the county of Tamatsukuri.

In the above mentioned districts, the selection of stallions and mares was made with a definite object, and horses with characteristics peculiar to each district were produced. But since foreign breeds were introduced, the distinctive points of the Naubu and Sendai horses have almost disappeared. The horses in the figure are thought to represent nearly the typical forms of the pure breeds.

The light built stallion is a native of Onikobe mura, three years old, 13 hands and 3 inches high, and is a dark-chestnut color; such horses are generally used as riding horses.

The heavy one is a Nanbu horse from Yakamimura, Kamikita county, Awomori prefecture. It is five years old and 14 hands high, and is black in color. It is mostly used as a draught horse, but it can also be used for riding; it is very hardy and has great endurance.

## JAPANESE CATTLE.

The principal breeding places of cattle in Japan are the prefectures included in San-yō-dō and San-in-dō. The most noted provinces in those prefectures are Tajima and Izumo. The cattle of these provinces are large, strong and gentle; they are well adapted to farm work and for draught.

The bull in the figure is a native of Nauami county, Tajima province, Hyōgo prefecture. It is eight years old and stands 13 hands and 2 inches high.

The figure shows the bull drawing a cart loaded with rice packed in straw bags on a street of the city of Tōkyō; the weight of the goods loaded on the cart may be from 3 to 5 hundred Kwan, (2484-4141 pounds.)







A  
BRIEF DESCRIPTION  
OF THE  
PICTURES OF JAPANESE  
HUNTING  
EXHIBITED IN THE  
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## JAPANESE HAWKING.

This sport was commenced in Japan fifteen hundred and thirty-nine years ago, (during the Reign of the Emperor Nintoku) ; during the middle ages it was only engaged in by the military class (samurai). During the time of the Tokugawa dynasty, it came much into vogue ; the Shōgun (the military ruler) and Daimyō (the feudal lords) appointed the falconers and encouraged the sport of hawking ; it is said that there are many secrets in the art of training falcons.

Every great Daimyō was obliged to present a certain number of the cranes caught by hawking to the Shōgun annually ; but this peculiar custom ceased with the fall of feudalism.

Hawking is performed in the following way : an officer called Torimiyaku walks round the hawking ground and informs the falconers if he finds the cranes located in the barley fields or the meadows. There are two falconers, one holds the falcon high with his arm and the other carries the hawking implements. They walk slowly and stealthily to the windward of the cranes and when as near to them as possible suddenly show themselves to them ; being thus alarmed, the cranes always fly to windward, the falcons are then let go and they fly straight to the cranes and seize them by the neck, and the battle begins, which however is shortlived and the cranes are soon brought to the ground and captured by the falconer who bears them off in triumph.

## TAKA-HAGO.

(METHOD OF BIRD CATCHING.)

This is the usual method of catching the small birds which migrate in large numbers from October to March.

A bamboo pole with bird-limed twigs is put among the branches of high trees, such as Celtis, Zelkova, &c. A number of cages with decoy birds are hung near the bird-limed twigs, and those birds gathering around the cages at the call of the decoys, light on the twigs and are caught.

## NAGASHI-MOCHI.

(FLOATING BIRD-LIMED ROPES.)

This is a method of catching wild ducks on the lakes, seas and other open waters.



Ropes wrapped with the young leaves of rushes are smeared with bird-lime boiled in oil. They are wound on large reels and are carried to the windward side of the water on boats. The boat-men hold the reels with the left hand and unwind the ropes with the right hand; the ropes are put on the water in a straight line in order that they shall not be entangled by the advance of the boat.

The ducks always swim to windward and in so doing touch themselves against the ropes floating to leeward, and their wings and feathers stick to the ropes. The more the ducks strive to escape by flapping their wings, the more the ropes will stick to them. Sometimes, by this means, many hundreds of ducks are caught in a short time.

The bird-limed ropes are much used on lake Tega in the prefecture of Chiba, together with Harikiri-ami.

### NAGE-AMI.

(A NET USED BY CASTING.)

This net is used for catching wild ducks in the provinces of Echizen, Kaga and Noto. It is made in the following way. Two light bamboo poles of the length of from five to six feet are so arranged that the upper ends are from two to three feet apart and the lower ends about two feet; a strong cord is fastened to the upper ends of the poles and a handle is fixed to the lower part; a net is spread between the two poles. The whole arrangement resembles a scoop-net somewhat.

Wild ducks are in the habit, when flying over mountains, of selecting narrow passes and just flying high enough to clear the tops of the brushwood in these passes, and the sportsman conceals himself in a likely place in the early morning or at dusk in the evening when the ducks are flying over, and on the approach of a flock, just at the right moment, suddenly raises the poles and casts the net over them. In this way many ducks are taken in one day by a skilful man.

### HARI-KIRI-AMI.

(CATCHING BIRDS WITH A SPREAD-NET.)

On the marshy lake called Tega in the prefecture of Chiba, wild ducks are caught by means of Harikiri-ami and bird-limed ropes. The time of this sport is from the middle of October to the end of February.

The inhabitants of the villages around the lake are formed into a company for the business of catching the ducks, and no outsiders are allowed to do more than look on. The custom has prevailed for one hundred and thirty years since (the time of Meiwa), and is a very exciting sport.

The lake Tega is divided into two portions by a dyke called Sengentsutsumi ; the western portion is called Kaminuma (the upper marsh) and the eastern portion is called Shimonuma (the lower marsh). The latter is surrounded with a bushy growth of reeds, and about four hundred ditches are made at a certain distance apart in the marsh, and nets are spread on the sides of these ditches or canals, which are full of water. Shimonuma is also divided into two smaller portions called Uchiba (the inner place) and Sotoba (the outer place) with a supposed straight line connecting two wooden posts, one of which stands on Miyojin-Zaki and the other on the Ochiui-gawa.

The hunting company consists of three hundred and fifty men who live in the twelve villages around the lake ; among those villages, Fusemura is the principal village. The number of nets possessed by one person is fourteen or fifteen, and the total number owned by the company is 5,200.

The net is as shown in the picture. The ropes on the upper and lower ends are called Michinawa and are eight feet six inches in length. The short ropes on the left and right sides are called Yokomichinawa and are about eight feet in length. The ropes which bind the four corners are called Tsubonawa ; the Tsubonawa on the upper part are about one foot long and those on the lower part are two feet. The bamboo poles which form the frame of the net are about twenty-four feet in length, and three and a half inches in circumference.

The best time for taking the ducks is on a clear and quiet night after the moon has set. The chief hunter of Fusemura, after carefully observing the weather indications as shown by the appearance of the sky, makes a signal to the villagers by beating a drum a little before the set of the moon. On this signal, all the members of the company go, each to his own proper place on boats and spread their nets on the edges of the ditches. Although the hunters work quietly and in strict order, yet by so many people moving at one time, the ducks become alarmed and fly up ; some of them going into fields and others to safe distances on the lake. The hunters, after they have finished the spreading of the nets, conceal themselves in the boats and wait until the moon is set.

At the same time, some of the hunters, of Fusemura send out fifteen boats on the waters of Uchiba and Sotoba to set bird-limed ropes, &c. ; they then station themselves in concealment, awaiting a signal. As soon as the moon is set, the chief hunter of Fusemura gives a command, on which the boats carrying the bird-limed ropes, &c., all go forth together and drive the ducks off the lake, and they fly towards the reeds on the edges of the ditches. The leading ducks strike against the nets ; some of them thrust their necks into the meshes and the others fall down into the net bags. The ducks in the rear on discovering the obstacles turn back towards the water where they are caught by means of the bird-limed ropes.

The sport is stopped early in the morning and all the hunters return to their villages. Ten ducks are caught per hunter in one night on the average and the total number of the ducks caught on this lake during a hunting season by the whole company is from 40,000 to 50,000.

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A  
DESCRIPTION  
OF  
BEES, HONEY, BEESWAX AND  
BEE APPLIANCES  
EXHIBITED IN THE  
WORLD'S COLUMBIAN EXPOSITION  
PUBLISHED BY  
AGRICULTURAL BUREAU,  
DEPARTMENT OF AGRICULTURE AND COMMERCE.  
J A P A N .

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1893.



## JAPANESE HIVE.

The hives used in Japan for the purpose of keeping bees are numerous.

The simplest and most convenient one is the hive called Sērobako which is used in district of Fukuoka. It is made of the old wood of pines, cryptomeria or persimmon. It consists of six square cases, each of which is 7.2—8.4 inches in length and breadth, 3.6 inches in height. They are put in the outer frame which is made of wood. There are two boards, one on the top forming the cover and the other at the bottom of the hive. The latter projects 2.4 inches from the lowest case as the alighting board, and can frequently be drawn out in order to remove excreta. Cross bars are put diagonally in each box except the lowest one. The entrances are made on the side of the lowest case, facing the alighting board. They consist of 1—3 rectangular holes, 0.36 inches in height (the broader the less is the number) and certain round holes, 0.36 inches in diameter, above the latter. The holes are so designed that bees alone can pass, but the enemies such as Akabachi (*Vespa* sp.); Yamabachi (*Bombus* sp.), Kumabachi (*Vespa* sp.) and Uchisuzume (a kind of moth) cannot enter through them. The inner surface of the hive, cross bars and the outer surface facing the alighting board must be rough without planing. The joints of the cases are fitted tightly and are pasted over with paper in order to keep out the rays of the sun. Moreover the outer surface of the whole arrangement is wrapped with straw mats in order to prevent the entrance of the cold and heat.

## THE WAY OF USING THE HIVE.

The introduction of bees into the hive is performed in the following way. The bees just swarmed are gathered on the lid of the iron bottle, which is made of straw and is called Rappo. The cover and three cases of the hive are pasted with paper and are hung down from the eave. The upturned lid with bees is brought under the cases and wrapped together with cases in a cloth. After a few hours, all the bees will have passed into the cases. Then other three cases are added and pasted with paper as is done before and the outer frame is put on. The whole arrangement is wrapped with straw mats and is hung in a place under eaves or trees where it is shady at the afternoon.



## THE METHOD OF COLLECTING HONEY.

Honey is collected in July or in August. In fine weather, the hive is taken down and the straw mats are taken off. The lower part of the hive is covered with a cloth and the cover is taken off. Bees are expelled downwards by fanning or smoking, and then the first case is cut off by means of fine iron wires or silk strings. The combs are then taken out from the case. Three cases are usually separated at one time. The cover is then put over the fourth case and three empty cases are added between the fifth and sixth cases. They are pasted over with paper and wrapped with straw mats as mentioned before. In using this hive, there is not such trouble as to hang the combs anew, because they are attached to the cross bars firmly. Moreover there is no danger that the combs will fall down.

### THE QUANTITY OF HONEY AND WAX PRODUCED BY A SWARM.

Honey .....	1640 Momme (13.582 pounds.)
Beeswax .....	60 Momme ( 0.497 pounds.)

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### THE PRICE PER KIN (1.325 pounds.).

Honey .....	9 Sen.
Beeswax .....	30 Sen.

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The plants from which bees collect honey are very numerous. The most important kinds are as follows:—



- Nanten (*Nandina domestica*, Thunb.)
- Midzuna (*Sinapis chinensis*, L.)
- Daikon (*Raphanus sativa*, L.)
- Kabura (*Brassica campestris*, L.)
- Kara-nadeshiko (*Dianthus chinensis* L.)
- Sazanqua (*Camellia sasanqua*, Thunb.)
- Cha (*Camellia theifera*, Griff)
- Tsubaki (*Camellia japonica*, L.)
- Sakaki (*Cleyera japonica*, Thunb.)
- Tororo-aoi (*Hibiscus manihot*, L.)
- Wata (*Gossypium indicum*, L.)
- Kinkan (*Citrus japonica*, Thunb.)

- Mikan (*Citrus nobilis*, Lour.)  
 Zabon (*Citrus decumana*, L.)  
 Kikoku (*Citrus fusca*, Lour.)  
 Daidai (*Citrus bigaradia*, Duham.)  
 Sendan (*Melica azedarach*, L. var. *subtripinnata*, Miq.)  
 Fushinoki (*Rhus semi-alata*, Murr. var. *Osbeckii*, DC.)  
 Hazenoki (*Rhus succedanea*, L.)  
 Urushi (*Rhus vernicifera*, DC.)  
 Hagi (*Lespedeza bicolor*, Turcz.)  
 Fuji (*Wistaria chinensis*, Sieb et Zucc.)  
 Fuji-mame (*Dolichos cultratus*, Thunb.)  
 Habusō (*Cassia occidentalis*, L.)  
 Niwa-mume (*Prunus japonica*, Thunb.)  
 Anzu (*Prunus armeniaca*, L.)  
 Sakura (*Prunus pseudo-cerasus*, Lindl.)  
 Mume (*Prunus mume*, Sieb et Zucc.)  
 Sumomo (*Prunus triflora*, Roxb.)  
 Hadankiō (*Prunus triflora*, Roxb. var.)  
 Momo (*Prunus persica*, Benth. et Hook.)  
 Shikizaki (*Rosa indica*, L.)  
 No-ibara (*Rosa multiflora*, Thunb.)  
 Ki-ichigo (*Rubus incisus*, Thunb.)  
 Biwa (*Photinia japonica*, Thunb.)  
 Sarusuberi (*Lagerstroemia indica*, L.)  
 Zakuro (*Punica Granatum*, L.)  
 Tōnasu (*Cucurbita pepo*, L.)  
 Kiuri (*Cucumis sativus*, L.)  
 Suiqua (*Citrullus edulis*, Spach.)  
 Udo (*Aralia cordata*, Thunb.)  
 Kanboku (*Viburnum opulus*, L.)  
 Yomena (*Boltonia cantoniensis*, DC.)  
 Kiku (*Chrysanthemum*, all varieties of.)  
 Yezogiku (*Callistephus chinensis*, Nees.)  
 Kiku-imo (*Helianthus tuberosus*, L.)  
 Shungiku (*Chrysanthemum coronarium*, L.)  
 Tsuwabuki (*Senecio Kœmpferi*, DC.)  
 No-azami (*Cnicus japonicus*, Maxim.)  
 Benibana (*Carthamus tinctoria*, L.)  
 Asebi (*Andromeda japonica*, Thunb.)  
 Tsutsunii (*Rhododendron indicum*, Sw. var. *Kœmpferi*, Maxim.)

- Kaki (*Diospyros kaki*, L. Fil.)  
 Hiragi (*Olea aquifolium*, Sieb et Zucc.)  
 Chishanoki (*Ehretia serrata*, Roxb.)  
 Asagao (*Ipomœa hederacea*, L.)  
 Hirugao (*Convolvulus japonicus*, Thunb.)  
 Nasu (*Solanum melongena*, L.)  
 Jawa-imo (*Solanum tuberosum*, L.)  
 Kiri (*Paulownia imperialis*, Sieb et Zucc.)  
 Shiso (*Perilla arguta*, Benth.)  
 Hakka (*Mentha arvensis*, L. var. *vulgaris* Benth.)  
 Odorikosō (*Lamium album*, L. var. *barbatum*.)  
 Soba (*Fagopyrum esculentum*, Moench.)  
 Ai (*Polygonum tinctorium*, Lour.)  
 Nioi-tade (*Polygonum viscosum*, Hamilt. var. *vernicosum*.)  
 Mizo-soba (*Polygonum Thunbergii*, Sieb et Zucc. var. *hastato*.)  
 Kusunoki (*Cinnamomum camphora*, Nees.)  
 Ganpi (*Wickstrœmia canescens*, Meisn var. *Ganpi*, Miq.)  
 Natsugumi (*Elæagnus pungens*, Thunb.)  
 Aburagiri (*Eleurites cordata*, DC.)  
 Nankinhaze (*Sapium sebiferum*, Roxb.)  
 Yudzuriha (*Daphniphyllum macropodum*, Miq.)  
 Yenoki (*Celtis sinensis*, Pers.)  
 Mukunoki (*Aphananthe aspera*, Planch.)  
 Shirakashi (*Quercus glauca*, Thunb. var. *forma sericea*.)  
 Kuri (*Castania vulgaris*, Lam. var. *japonica*, DC.)  
 Ichō (*Ginkgo biloba*, L.)  
 Kakitsubata (*Iris lævigata*, Fisch.)  
 Suisen (*Narcissus Tazetta*, L. var. *chinensis*, Rœm.)
-







# DETAILS

OF THE

## WEIGHTS AND MEASURES

BY

The Bureau of Commerce and Industry,  
Department of Agriculture and  
Commerce, Japan.



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1893.











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# DETAILS

## OF THE

### WEIGHTS AND MEASURES.

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#### IMPLEMENTS USED FOR THE INSPECTION OF WEIGHTS AND MEASURES.

(Department L. Group 151. Class 865.)

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The Implements used for the Inspection of Weights and Measures is applied to determine the measuring Apparatus of Capacity and Weight in conformity with the Weights and Measures Law put into force from January 1, 1893.

#### MEASURING APPARATUS OF LENGTH FOR THE USE OF INSPECTION.

##### No. I.

###### First Straight Measure.

Applicable to the Inspection of Straight Measures, Crooked Measures, and Fold Measures of Japanese System.

Material.....Brass.

**GRADUATING.**—The entire length is 3 shaku, two shaku of which is graduated on each 1 bu space, and the remaining one shaku, on each 5 rin space, and it is on the extremity of the latter that on both sides of 4 rin, 5 mō graduations are added to show the common difference.

##### No. II.

###### Second Straight Measure.

Used for the inspection of Metrical Straight Measures, Crooked Measures, and Fold Measures.

Material.....Brass.

GRADUATION.—The entire length is 1 meter graduated on each 1 millimeter space, and on one extremity,  $\frac{1}{10}$  millimeter graduations are added on both sides of the space of one millimeter to show clearly the common difference.

### No. III.

#### Third Kujira Shaku.

Is a scale used for measuring the length of Cloths, and 1 shaku it meets to the 1 shaku 2 Sun and 5 Bu of Common Measures, and is used for the inspection of Kujira Shaku.

Material.....Brass.

GRADUATION.—The whole length is 2 shaku of Kujira Shaku with a graduation on each 1 Bu space of Kujira Shaku, and on one extremity of it is graduated 2 rin degrees of Kujira Shaku for the reference of the common difference.

### No. IV.

#### First Tape.

Is used for the inspection of Tapes and Chain Measures of Japanese System.

Material.....Steel.

GRADUATION.—The whole length measures 18 shaku, and 12 shaku of one of its extremities is graduated on each space of 1 Sun, while 6 Shaku of another extremity, on each space of 1 Bu, with 2 Rin degrees added on both sides of 4 Bu for the reference of common difference.

### No. V.

#### Second Tape.

Used for the inspection of Tapes and Chain Measures of Metrical System.

Material.....Brass.

GRADUATION.—The whole length is 5 meters, and on one extremity of it, the space of 3 meters are graduated on each 5 centimeters, the following 1 meters, on each 5 millimeter, and the space of 1 meter following above, on each 1 millimeters. On this extremity, both sides of the degrees for the space of 15 millimeters is graduated with  $\frac{1}{2}$  millimeter degree to show clearly the common difference.

# MEASURING APPARATUS OF CAPACITY FOR THE INSPECTION.

## No. VI.

First Measuring Apparatus of Capacity. Is used for the inspection of the capacity of the measuring instruments of Japanese System.

Material.....Brass.

KINDS.—1 Shaku, 2 Shaku, 5 Shaku, 1 Gō, 2 Gō, 2 Gō 5 Shaku, 5 Gō, 1 Shō, 2 Shō, 5 Shō, and 1 To : 11 kinds in all.

## No. VII.

Second Measuring Apparatus of Capacity. Is used for the inspection of the capacity of Metrical System.

Material.....Brass.

KINDS.—1 Centimeter, 2 Centimeter, 5 Centimeter, 1 Decimeter, 2 Decimeter, 5 Decimeter, 1 Litre, 2 Litre, 5 Litre, 10 Litre, and 20 Litre : 11 kinds in all.

## No. VIII.

Scales used for measuring the measuring apparatus of capacity. Is used for the inspection of the length, depth, and width of the Capacity Measures.

Material.....Brass.

KINDS.—First Measuring length used for Capacity Measures.

Second Measuring length used for Capacity Measures.

Third Measuring length used for Capacity Measures.

GRADUATION.—On one surface of No. 1 and No. 2 Measures used for capacity measures is engraved the diameters of all the circular measuring apparatus of capacity of Japanese System and their common differences, while on other surface the common differences and the diameters of all capacity measures of metrical System are engraved. No. 3 Scale used for the inspection of capacity measures has on one of its surface the engraved diameters of all square capacity measures of Japanese System and common difference, while on the other it is carved with the Length, Breadth and Depth of "Togai" with their common differences.

#### WEIGHT MEASURES USED FOR THE INSPECTION.

##### No. IX.

###### First Weight.

Is used for the inspection of the weight of Japanese System, and for the inspection of the capacity of capacity measures by the weight of water.

MATERIAL.—Upwards of 2 kwamme, Iron; from minimum to 2 fun, Aluminium; and others, all Brass.

KINDS.— $\frac{1}{10}$ th of Mō,  $\frac{1}{10}$ th of Mō,  $\frac{1}{10}$ th of Mō, 1 Mō, 2 Mō, 5 Mō, 1 Rin, 2 Rin, 5 Rin, 1 Fun, 2 Fun, 5 Fun, 1 Momme, 2 Momme, 5 Momme, 10 Momme, 20 Momme, 50 Momme, 100 Momme, 200 Momme, 500 Momme, 1 Kwan, 2 Kwan and 5 Kwan : 24 kinds in all.

##### No. X.

###### Second Weight.

Is used for the inspection of the capacity of capacity Measures and the Weight of Material System by the Water Weight.

MATERIAL.—Upward of 2 Kilogramme, Iron; from minimum to 5 decigramme, Aluminium; and all others, Brass.

KINDS.—1 Milligramme, 2 Milligramme, 5 Milligramme, 1 Centigramme, 2 Centigramme, 5 Centigramme, 1 Decigramme, 2 Decigramme, 5 Decigramme, 1 Gramme, 2 Gramme, 5 Gramme, 10 Gramme, 20 Gramme, 50 Gramme, 100 Gramme,

200 Gramme, 500 Gramme, 1 Kilogramme, 2 Kilogramme, 5 Kilogramme, 10 Kilogramme and 20 Kilogramme ; 23 kinds in all.

No. XI.

Large-sized Beam-Balance, Maximum 10 kwan, Minimum 5 fun, is used for the inspection of the weight and for the inspection of the capacity of the capacity measures by the weight of water.

No. XII.

Medium-sized Beam-Balance, Maximum 1 Kwan, Minimum 1 Rin, is used for the inspection of the weight, and for the inspection of the capacity of the capacity measures by the weight of water.

No. XIII.

Small-sized Beam-Balance, Maximum 50 Momme, Minimum 1/10th of 1 Mō, and is used for the inspection of the weight.

WEIGHTS AND MEASURES.

(Department L. Group 151. Class 865.)

APPARATUS OF WEIGHT MEASURING.

Heretofore the balance and the weights employed in Analytical Chemistry was mostly imported from Europe and the United States, but the considerable progress of the industrial arts of the country at the later times left no room for the dissatisfaction towards the application of those made in the Empire. The proof of it can be seen by the articles to be exhibited on this occasion.

No.	NAME OF WEIGHTS OR MEASURES MANUFACTURED.	VALUE.	NAME OF MANUFACTURERS.
		yen.	
1	Balance.	50.000	Tokio, Sato Yoshisaburo.
2		40.000	
3	"	95.000	" " Moriya Sadakichi.
4	Weight.	10.000	" Sato Yoshisaburo.
5	"	8.000	" " "
6	"	12.000	" Moriya Sadakichi.
7	"	12.000	" " "



# WEIGHTS AND MEASURES.

(Department H. Group 112. Class 706 and 710).

As the precise measurement weight can not be perceived by the measurement of Japanese Scale used in the Empire of old, the employment of plat form Scale and the Letter Weight had became prevalent lately, with the corresponding improvement in the art of their manufacture. But the inconvenience of their transportation impeded them to supersede completely the use of Japanese Scale and the investigation on the latter weight seems to have the omen of success. No. 4—No. 9 should prove this, *Kujira Shaku* is used in measuring cloths.

## WEIGHTS AND MEASURES. (Class 706).

No.	NAME OF WEIGHT.	VALUE.	NAME OF MANUFACTURER.
		yen.	
1	Plat form Scale.	9.000	Tokyo, Sato Yoshisaburō.
2	"	25.000	Osaka, Yamamoto Seinosuke.
3	"	12.000	" "
4	Japanese Scale.	1.900	" "
5	"	1.024	" "
6	"	1.875	" "
7	"	1.290	" "
8	"	0.790	" "
9	"	0.683	" "
10	Box Measures & Togai.	6.330	Tokyo, Shirotsuba Genzō.
11	Straight Measure.	0.400	" Nakamura Asakichi.
12	"	0.300	" "
13	"	0.500	" "
14	"	0.200	" "
15	"	0.080	" Nakamura Asakichi.
16	Kujira Shaku.	0.080	" "
17	"	0.030	" "
18	Fold Measure.	0.130	" "
19	"	0.090	" "
20	Kujira Shaku.	0.070	Osaka, Yoshinoto Toku.
21	"	0.120	" "
22	"	0.050	(Kanagawa Prefecture. Suzuki Jiuichi.
23	"	0.120	"

(Class 710).

No.	NAME OF MEASURES.	VALUE.	NAME OF MANUFACTURER.
1	Letter Weights.	yen. 7.500	Tokyo, Sato Yoshisaburo.
2	"	4.500	" "
3	"	3.000	" "
4	"	10.000	" Moriya Sadakichi.

MEASURERS. (Class 710).

In the measure used in drawing the bamboo measure is preferable as there is no bending, expansion, or contraction like brass measure seconding the temperature.

No.	NAME OF SCALE MEASURES.	VALUE.	NAME OF MANUFACTURER
24	Straight Measure.	yen. 2.000	Tokyo, Nakamura Asakichi.
25	"	0.800	" "
26	"	0.300	" "
27	"	0.080	" "
28	"	2.400	" "
29	"	1.200	" "
30	"	0.500	" "
31	"	1.000	" "
32	"	0.500	" "
33	"	0.200	" "
34	"	0.050	" "
35	"	1.000	" "
36	"	0.500	" "
37	"	0.200	" "
38	"	0.050	" "
39	"	0.160	" "
40	"	0.140	" "
41	"	0.040	" "
42	"	0.140	" "
43	"	0.120	" "
44	"	0.040	" "
45	"	0.500	" "
46	"	0.160	" "
47	"	0.080	" "
48	"	0.500	" "

No.	NAME OF SCARE MEASURES.	VALUE.	NAME OF MANUFACTURERS.
49	Straight Measure.	yen. 0.200	Tokyo, Nakamura Asakichi.
50	"	0.080	" "
51	"	0.500	" "
52	"	0.200	" "
53	"	0.060	" "
54	"	1.600	" "
55	"	0.800	" "
56	"	0.400	" "
57	"	1.400	" "
58	"	0.400	" "
59	"	0.200	" "
60	"	1.400	" "
61	"	0.400	" "
62	"	0.200	" "
63	"	0.340	" "
64	"	0.100	" "
65	"	0.060	" "
66	"	0.800	" "
67	"	0.360	" "
68	"	0.240	" "
69	"	0.250	" "
70	"	0.100	" "
71	"	0.060	" "
72	"	1.000	" "
73	"	0.400	" "
74	"	0.160	" "
75	"	0.800	" "
76	"	0.300	" "
77	"	0.140	" "
78	"	0.200	" "
79	"	0.120	" "
80	"	0.160	" "
81	"	0.100	" "
82	"	0.170	" "
83	"	0.110	" "
84	"	1.800	" "
85	"	2.000	" "
86	"	1.200	" "
87	"	1.200	" "
88	"	0.090	{ Kanagawa Prefecture. Suzuki Jinichi.
89	"	0.800	"
90	"	0.700	"
91	"	0.070	Osaka, Yoshimoto Toku.
92	"	0.100	" "
93	"	0.080	" "
94	"	0.350	{ Kanagawa Prefecture. Suzuki Jinichi.

Carpenter, Screen makers, Tub makers, joiners, etc., all use. The right angled measure. This measure is not only to measure the length, but, right-angled and inclinations calculated. It is not also used as rules.

No.	NAME OF MEASURES.	VALUE.	NAME OF MANUFACTURERS.
95	Right-angled Measure.	yen. 2.250	Tokyo, Nakamura Asakichi.
96	"	1.650	" "
97	"	1.500	" "
98	"	0.350	" "
99	"	0.350	" "
100	"	1.000	Osuka, Yoshimoto Toku.
101	"	0.850	" "
102	"	1.100	" "
103	"	0.950	" "
104	Plat form Scale.	15.000	" Yamamoto Seinosuke.

















