

Breeding of the Peanut in Japan

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History of cultivation

The peanut culture started in around 1875 in Japan with the seeds imported from China and U.S.A., and the yield has reached about 130,000 tons (unshelled nuts) a year recently. However, its cultivation and study have rather short history, because the cultivation increased rapidly only after World War II, especially after 1955.

Before the war peanuts were cultivated in some warm regions south of the Kanto district, and the varieties were the runner type which had been first introduced into this country, and bunch and runner types subsequently segregated from the original type.

At that time the cultivation of peanuts all depended on hand labor from planting to digging and picking, and 300 h per 10 a of labor was needed for the culture. An increase of peanut acreage could not be expected from each farmer under these conditions.

The yield was only about 30,000 tons a year at the maximum in those days owing to the low productivity of varieties and the primitive method of cultivation. And the product, as a local unique crop in limited areas of the country, was dealt through only special markets.

Among the rapid recovery and development of various industries after World War II the agricultural production has also remarkably increased in Japan. During the development there appeared new productive varieties in peanut culture. They were prolific of pods, intermediate growth habit, and the

branches were short. The new varieties contributed remarkably to an increase of productivity in peanut culture in cooperation with the use of tillers which were newly introduced into agriculture at that time. Powered pickers also invented in those days. The system of machinery cultivation technique has been thus established in peanut culture before other crops. The working hours, as a result, decreased to about 50 h per 10 a, about 1/6 as



Fig. 1. Digging of peanuts with a small machine.

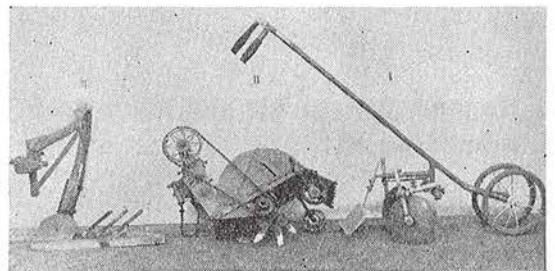


Fig. 2. Various small apparatus.
1. Soil covering machine
2. Rotary cultivator
3. Digging apparatus

short as in the prewar days, and the yield was increased to more than 200 kg per 10 a.

Breeding and varieties in the prewar days

Though the peanut culture began with varieties of the runner type as mentioned above, varieties of the bunch type have also been widely cultivated with the old type after about 1880 when that type was segregated by a farmer in Kanagawa Prefecture.

The improvement of peanut varieties by pure line selection was started subsequently in main peanut-growing prefectures, Chiba and Kanagawa, and new varieties Chiba No. 43 (runner type), Chiba No. 55 (intermediate type) and Chiba No. 74 (jambo runner) were obtained by the Chiba Agricultural Experiment Station in 1930 with the aid of the Ministry of Agriculture and Forestry, and bunch-type varieties Tachi-rakkasei No. 1 and Tachirakuda No. 1 (jumbo) were bred by the Kanagawa Agricultural Experiment Station independently in 1936. These varieties were distributed not only in both prefectures but also in many other main peanut-growing regions widely, and were the representative ones before the war in Japan.

In addition to the above-mentioned ones some large-grained (Virginia type) and small-grained (Spanish and Valencia types) varieties had been derived from the seeds imported now and then from Ryukyu, Formosa and China were in cultivation in various regions as unknown varieties, though the acreage was small.

Demand for peanuts and peanut culture at present

As the varieties which were introduced in the early days were large-grained ones, peanuts were exclusively consumed for roasting before the war. But the use of peanuts has been extended for salted peanuts and candy as well as roasting after the war. And the demand for small-grained

peanuts has remarkably increased recently. The use for extracting oil, manufacturing paste, and staple and subsidiary foods, however, is very little in Japan unlike other countries.

Widely cultivated peanut varieties are Virginia type used for roasting in Japan from the prewar days until now, and Spanish and Valencia types are cultivated in limited areas where Virginia type are not suitable for cultivation.

Virginia type are distributed in warm regions of volcanic ash soil or sandy soil south of the Kanto district, and Spanish and Valencia types which are short in growing period are cultivated in areas north of the Kanto district and in cool highlands.

As the peanut culture depends not only on environmental conditions and cultivating techniques but also on special markets in Japan, it is difficult to extend the acreage of cultivation to new areas. The remarkable development after the war was, therefore, mainly achieved by an increase of the percentage of peanut culture among the crops in the old producing places or their neighboring areas. The peanut acreage has thus formed 60~80% of the area of farm land in those places, resulting continuous culture of peanuts. Under these conditions the injurious effect of continuous culture has been noticeable since about 1965, and the productivity is going down now.

On the other hand, the demand for peanuts has increased so much that it can not be



Fig. 3 Damage by continuous culture.

supplied with domestic production, and the import of large-grained peanuts has reached 10,000-20,000 tons (shelled nuts) a year recently.

Object of breeding

As Virginia type peanuts are mainly used for roasting or salted peanuts, and Spanish and Valencia types are for candy in Japan, they are strongly demanded to be superior in quality and taste. Besides these, the size and shape of nuts, the color of seed coat, and especially for roasted in shall peanuts the shape and color of the shell as well as the depth of veins on the shell are always matters of concern in the peanut culture.

From a view point of cultivation, primarily demanded are such varieties as resistant to leaf spot, productive, and superior in quality and taste. And breeding of varieties resistant to *Diplodia natalensis* and *Meloidogyne hapla* are also urgently needed for prevention of the injuries by the continuous culture mentioned above.

There is a limit of saving labor for cultivation by the use of small agricultural machines, and it is a common problem for all the crops to increase rapidly the productivity by introduction of large machines as it is a direction of agriculture in Japan. However, fertilization and seeding are the works very difficult to be done by the machines in the culture of peanuts which are seeded between the rows of the previous crop in Japan. Furthermore, there is little prospect that the single crop of peanuts in a year can maintain itself in the agriculture of Japan at present and in near future. From these points of view it seems necessary to breed large-grained varieties suitable for late seeding after the harvest of the previous crop (mainly wheat or barley) to obtain a good second yield.

An increased production of small-grained peanuts is also strongly demanded with a rapid increase of their consumption for candy, so peanut culture will be promising as a labor saving stable crop in dry field areas

and cool highlands north of the Kanto district. Spanish and Valencia types are comparatively higher in the adaptability for late seeding, and suitable for the late-seeding culture with large machines in open fields south of the Kanto district. The breeding of small-grained peanuts to obtain superior early-ripening productive varieties is also one of our objects.

Breeding after the war

The ministry of Agriculture and Forestry has started the breeding of peanuts as a part of the measures for promotion of upland farming after World War II since 1947.

The breeding was also carried out in main peanut-growing prefectures individually. And Chiba-handachi was bred by pure line selection in the Chiba Agricultural Experiment Station in 1953, Kairyō-handachi, Wakaminori and Toyokodachi were obtained by artificial crossing and pure line selection in the Kanagawa Agricultural Experiment Station in 1959, and Ichifusa and Osuzu were obtained by artificial crossing in the Miyazaki Agricultural Experiment Station, being recommended for cultivation in each prefecture.

Among these new varieties bred by the prefectures Chiba-handachi was rapidly popularized as a productive variety suitable for mechanical cultivation, taking the place of local varieties of the intermediate type. It has been widely introduced into main peanut-growing places throughout the country.

The breeding in the prefectures, however, was discontinued as the governmental undertaking had made a good start.

The governmental undertaking is now entrusted to the Chiba Agricultural Experiment Station (since 1955) and the Kumamoto Agricultural Experiment Station (since 1967) after several times of reorganizations to carry out the breeding as a work designated by the ministry. Both stations are allotted the work for the respective areas (the former station mainly for the Kanto district and the latter mainly for the Kyushu district).

The system of breeding is nearly the same

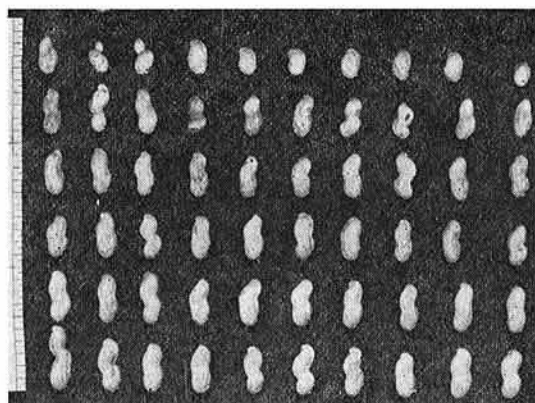
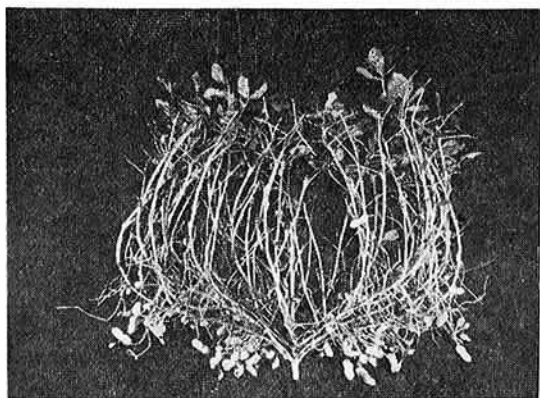


Fig. 4. Azuma-handachi (a superior productive variety of the intermediate type).

as in other crops, rice, wheat, soybean, maize, etc.

The breeding is being carried out centering around the hybridization by artificial crossing. But the induction of mutants resistant to

diseases and pests is also being tried partly by means of radiation (Co^{60}).

The method of breaking dormancy and the effective system for the use of green houses were now under investigation to reduce the term of breeding.

Fundamental studies and investigations on various problems in the rationalization of breeding and in the improvement of cultivation are also being carried out, because the history of studies on peanuts is short, and the groundings in breeding and cultivation are still insufficient in Japan.

The varieties and main strains which were obtained until now by the experiments designated by the ministry are as follows.

Large-grained varieties

- 1) Productive and superior in quality (intermediate type)
Azuma-handachi (registered with the ministry
Kanto Nos. 7, 8, 10, 12, 14, 19, 20, and 21.
- 2) Leaf spot-resistant (intermediate type)
Kanto Nos. 17, 18 and 22.
- 3) Early-ripening (bunch type)
Kanto Nos. 4, 9 and 16.

Small-grained varieties

- 1) Productive and superior in quality (bunch type)
Kanto Nos. 6, 11 and 23.
Hakuyu 7—3 (obtained by pure line selection).