Agronomic Characters of Mulberry Varieties Cultivated in South Sulawesi of Indonesia

By MASARU YAMAMOTO*

Kyushu Branch Station, Sericultural Experiment Station
(Ueki, Kumamoto, 861-01 Japan)

Two major tribes, the Bugis and Makassar, in South Sulawesi have loved silk since ancient days. It is said that sericulture was introduced from China-continent together with raw silk about 500 years ago. The majority of people of the tribes are Islamite, and their formal dresses, sarung and baju bodo, for religious observance and marriage ceremony are made of silk fabric. Thus, silk is indispensable for their livelihood.

The sericulture in South Sulawesi was fatally damaged by severe drought in 1972 and terrible outbreak of pebrine of silkworm. As a result, the raw silk production, which was 138 tons in 1971, was decreased to only 27 tons in 1974.[4] To overcome such a situation for the development of sericulture, the Government of Indonesia made a request for technical cooperation from Japan, which has advanced technology of sericulture. Upon the request, Japanese Government helped to establish Indonesia-Japan Sericultural Cooperation Project in Gowa of South Sulawesi, to which Japanese experts are sent along with the donation of necessary materials and equipments for an expected period from 1976 to 1985, aiming at developing appropriate technology and guiding Indonesian technical staffs.

The author was in charge of the Moriculture Division of the Project from 1980 to 1982. Although the outline of the work there was shown in JICA report,[6] agronomic characters and shoot growth characteristic of mulberry varieties in South Sulawesi will be described in this paper.

Mulberry cultivation at the farmers level

Climate of this district has dry season (April–October) and rainy season (November–March). Annual precipitation is 500–3,000 mm, and air temperature ranges from 29 to 32°C in the daytime throughout the year. The climate is favorable for mulberry growth.

However, most of mulberry fields there have been small sized so far, being placed in barnyard or dotted among coconut trees. Mulberry shoots are cut off by using "Parang," a hatcher, and are given to silkworms: there has been no technique of training and harvesting. There is no definite silkworm rearing season, and no fertilizer application to mulberry fields, i.e., very extensive cultivation.

Recently, however, as a result of spread of technical guidance, improved mulberry fields have emerged in the main sericultural region such as Soppeng, Wajo, Sidrap, etc. In most of them, the planting by cuttings at a square spacing of 1×1 m is adopted. The training aims at a medium-cut at the height of 50–70 cm above ground surface. Some farmers have begun to use pruning scissors for harvesting and trimming. Furthermore, the application of urea, domestically manufactured, to mulberry fields has started, aiming at increasing yields.

Almost all varieties cultivated by farmers belong to M. nigra**. The reason why M. nigra,

* Present address: Upland Crops Division, Kyushu National Agricultural Experiment Station (Ueki, Kumamoto, 861–01 Japan)

** Mulberry varieties cultivated or preserved in South Sulawesi are all introduced from Java, and called M. nigra, M. alba, M. australis, etc. These names are thought to have derived from species names, *Morus nigra* Linn., *M. alba* L., *M. australis* P., etc. However, according to Katsumata, F.,[1,2,3] and Zito, S. et al,[7] some of them do not coincide with their original species as to morphology of flower, leaf and shoots, and the number of chromosomes. Therefore, these names are merely regarded as "mulberry variety" in this paper.

which has a high vitality of tree, but a low productivity with small leaves, has come to be used in this district is not clear, but it seems that M. nigra has spread in this district, where cuttings are used to establish mulberry fields, because of its vigorous rooting ability. Inquiries to farmers showed that they had no definite concept of selecting high yielding varieties with good quality for their cultivation.

No indigenous mulberry was found, as far as the author's observation is concerned.

Selection of recommendable varieties

1) Selection experiment of varieties

To select out more productive varieties which can replace M. nigra, leaf quality, growth, and yield of 6 varieties introduced from Java were examined with and without urea application at the rate of 210 kg/ha/year (100 kg N/ha). Yield-increase by the low level of N application can also be shown by this experiment.

The total yield (4 harvests a year) was apparently the lowest for M. nigra. Yield-increase by N application was more with high-yielding varieties than with M. nigra (Fig. 1). M. multicaulis showed the highest yield, but is not practicable due to its poor rooting of cuttings. M. macroura showed a high yield without N application, but it was regarded to have low food value due to its coarse leaves. After all, M. alba was selected as a recommended variety for an immediate use, because it gives higher yield than M. nigra, and it has thick leaves, as a result of late occurrence of leaf hardening. It was planned to produce scions (scions for cutting) of M. alba to be supplied to farmers.

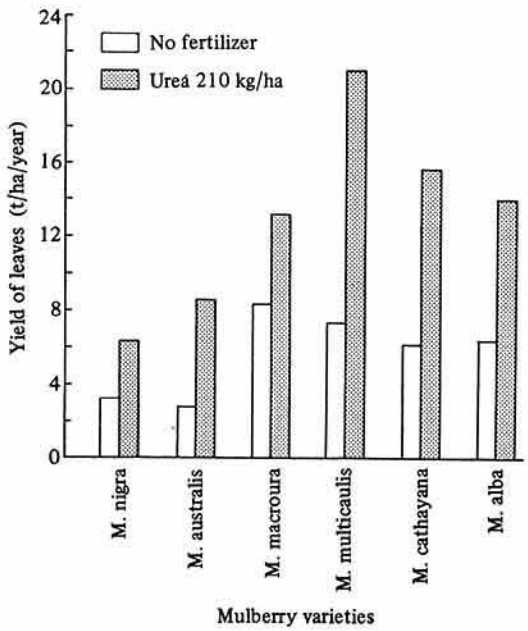

Fig. 1. Effect of urea fertilization on leaf yield of different mulberry varieties

2) Test of rooting ability of M. alba

As the rooting ability is a key factor for the extension of varieties in this district where cuttings are used to establish mulberry fields, that of M. alba selected as a recommended variety was tested. Scions prepared from different positions of shoots after different growth periods subsequent to pruning (2–6 months after pruning) were used for the test. Length of the scions was 20 cm. Fifty scions were used per plot with

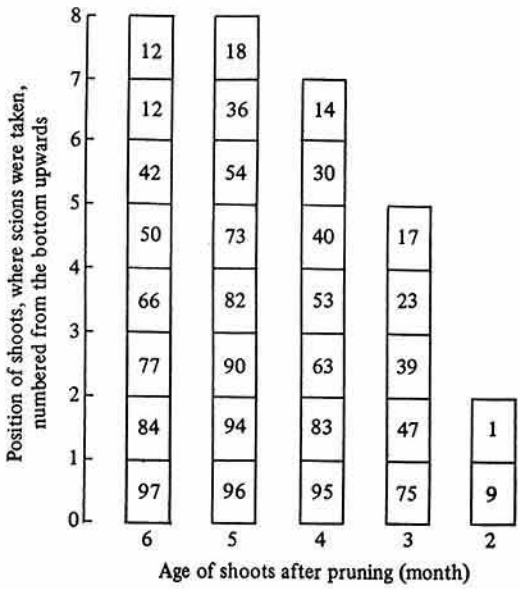

Fig. 2. Rooting ability of scions taken from different portion of mulberry shoots at different growing stages of the shoots Varieties, M. alba. The numbers in the blocks of each column are percentages of rooted scions.

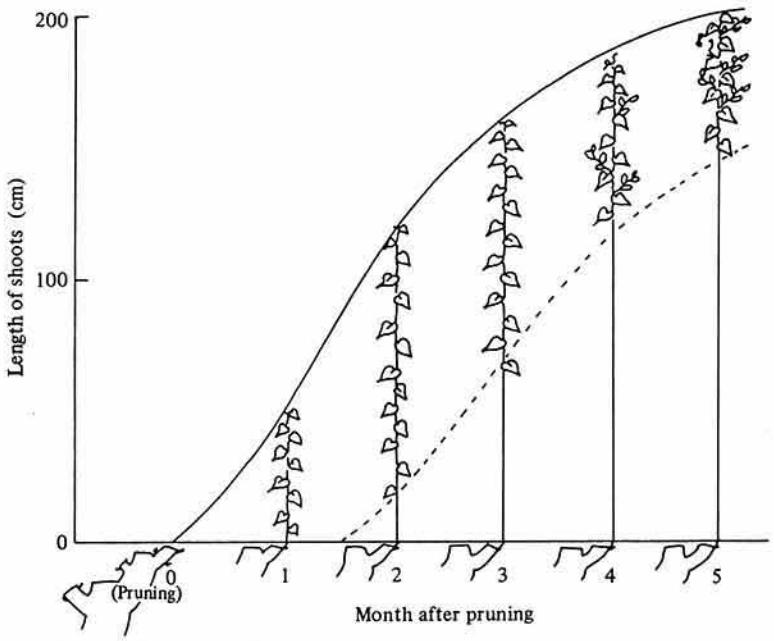

Fig. 3. Schematic diagram showing shoot growth and defoliation in mulberry trees after pruning
—— growth curve
------ defoliation

two replications, and rooting percentage was surveyed by digging up the scions after 3 months.

As shown in Fig. 2, the rooting percentage is markedly influenced by the growth periods after pruning: scions taken from young shoots (2 months after pruning) hardly rooted, whereas shoots of 5–6 months of age showed rooting percentage higher than 50% even when the 5th scion counted from the shoot base was used. Thus, the rooting ability is closely related to the aging of shoots.

Although it is said that M. alba has lower rooting ability than M. nigra, the former can be used as a recommended variety with an attention to the aging of shoots in preparation of scions.

Growth characteristics of mulberry

Shoots of M. nigra and M. alba were cut at their base, and the subsequent budding, growth of new shoots and defoliation at the lower part of the shoots were surveyed at intervals of one month. The result revealed that the varietal difference in the pattern of budding, growth, and defoliation wes quite small, both plants are of non-dormancy, and growth in the dry season is less than that in the rainy season.

The growth curve indicates vigorous growth during the period of 30–60 days after cutting, followed by a gradual slowdown afterwards. The defoliation at the lower part of shoots started 50–60 days after cutting (40–50 days after budding), and increased rapidly. On the 90th day, the length of defoliated shoot became longer than the length of leafy shoot (Fig. 3).

According to Takada,[5] a cultivar, Ichinose (*M. alba* L.), showed a leaf life of 90–120 days, and a subtropical-origin Shimaguwa (*M. acidosa* G.) about 60 days. The result of the present survey showed 40–50 days, fairly shorter than that in Japan. It implies that the amount of harvested leaves reachs a peak at about the 30th day after pruning, but it turns to decrease after that. The suitable stage of leaf harvest exists within a limited period of 2–3 months after pruning. Accordingly, it is important to decide the silkworm rearing season by taking the growth of mulberry into account. Thus, it is desirable

to establish a system of year–round harvesting of mulberry.

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(Received for publication, October 24, 1984)