Selection for Banana c. v. Leb Mue Nang for Direct Consumption and for Dried Banana Processing

Withya Buajarern
Department of Horticulture, Faculty of Agricultural Technology King Mongkut's Institute of Technology Ladkrabang

Ruamjit Nokkaul, Teerayut Wijitparp and Sumonrat Jintanasirinuruk
Chumphon Campus, King Mongkut's Institute of Technology Ladkrabang

Abstract

The research was conducted to select the desirable cultivars of the Leb Mue Nang banana for direct consumption and for dried banana processing. Fifteen elite cultivars from Suratthani Horticultural Research Center were brought to grow for the final trial and selection at the experimental plot of Chumphon Campus, King Mongkut's Institute of Technology Ladkrabang, Chumphon Province during the years 1998 to 2000.

The results indicated that with systemic growing of 2x3 meters spacing and moderate cultural practices of providing irrigation water and fertilizer, weeding and tillaging had significant effects on better plant growth, higher yield production and better quality. All cultivars could grow well and produced high yield. Considering for fruit production, direct consumption and dried processing, the data pointed out that 6 cultivars were desirable. The optimum temperature and duration used for drying bananas was 95-105°C for 3 days period.

Keywords: Leb Mue Nang banana, selection of cultivars for direct consumption and for dried processing.

1. Introduction

The Leb Mue Nang banana is an indigenous crop to the south of Thailand. It has genome AA with chromosome number of 2n = 22[2,5]. The bananas that belong in this group are Kloa Khai of Thailand, Senorita of the Philippines, Pisangmas of the Malaysia, Lady's finger of Hawaii, and Apple banana of the West Indies [6,7]. Eventually, the Leb Mue Nang has many desirable fruit qualities, e.g. peel and flesh have yellowish appearance, sticky and tender, aromatic, good taste, thick peel, short and strong fruit deduncle, and good orientation of fruits in hand. Besides, the fruit size varies from small to medium which is similar to the small Gross Michel banana, and suitable for individual consumption consuming. With many desirable fruit qualities, the Leb Mue Nang, thus has highly potential to be developed to be the commercial variety for the domestic market and for export [3].

The Leb Mue Nang banana is grown mostly in Chumpon, Nakornsrithamrat, Phuket and Pang-nga provinces. The farmers grow this banana for home consumption and for sale to markets for direct consumption as fresh and dried bananas. When sold to the markets, as fresh or dried fruit, the most important criteria that farmers and producers must be aware of is as follows : the color of the ripening fruit, the texture of the dried fruit flesh and its taste. In addition, good orientation of fruit in hand is a very important consideration for fresh fruit which must be transported from production sites to markets or factories.

From the survey, the researchers found that in each growing area there were many cultivars of Leb Mue Nang grown. Issarakraisila and Srikul [4] had studied and collected the cultivars of Leb Mue Nang from various plantations, they found that by using color of leaf sheath and hairs on fruit, the Leb Mue Nang

could be divided into 4 groups; (1) group that had green sheath and no hair on fruit, (2) group that had green sheath and had hairs on fruit, (3) group that had purple sheath and no hair on fruit, and (4) group that had purple sheath and had hairs on fruit. They also found that within each group, the banana could be divided into sub-groups of small, medium, and large fruit sizes. However, the size of fruit did not only depend on the cultivar but it was also depend on the cultural practices and environments at the planting time [1].

In selection for the desirable cultivars, the selected cultivars must meet the standard criteria, i.e. they must have at least 7 hands/bunch, at least 5 hands have to have good orientation, each hand has to have at least 15 fruits, and the fruits have to have good appearance and good taste.

The objectives of this research were: (1) to select the high yield cultivars of Leb Mue Nang which are desirable for fresh and dried processing consumption, (2) the transportation of Leb Mue Nang that the farmers or the dealers have been using so far, what means is the best, and how it can be improved to decrease damage from transportation, and (3) the present method of drying that the farmers and the dealers have been using, what means is the best, and how this can be improved to obtain the best quality with the best taste.

2. Materials and Methods

2.1 Collection of cultivars and trials: Fifteen elite cultivars of Leb Mue Nang from Suratthani Horticultural Research Center were collected and grown at the experimental plots of the Chumphon campus, Chumphon province. The clones were selected from the parents in each row, 14 clones per parental cultivar. The collected clones were planted in planting holes 60 cm. depth, 50 cm. diameter with 3x2 meters spacing. Five kilograms of farm manure, 1 teaspoon of furadan, 250 gm. of 15-15-15 fertilizer, and 250 gm. of 8-40-0 fertilizer were applied to each plant as basal supplements. After planting, 20 litres of irrigation water per week were applied to each plant (no irrigation in case of having rainfall). Six weeks after planting, 100 gm./plant of 15-15-15 and 50 gm./plant of 46-0-0 fertilizers were applied. Thereafter every two months the same kind and amount of fertilizers were applied until harvesting. The data on growth and yield of the 15 cultivars were collected and compared.

2.2 Studies on the market of fresh fruits and dried processing: Studies and collection of the data on the desirable qualities of the fresh fruits and dried banana that the consumers preferred, i.e. size of fruit, color of fruit, taste, and general appearance were done. Meanwhile, the drying techniques from different dealers were observed too. The data collected would be used to make selection of cultivars for fresh consumption and for dried banana processing, and would be used to develop the techniques of harvesting, packaging for transportation, and drying technique for good quality, good appearance, and good taste of dried banana.

2.3 Place and time of studies: The survey and collection of data were done in the farmers' farms in Langsuan, Sawee, and Tasae districts, and at the experimental plots of Chumphon campus, Chumphon province. The data on selling of fresh and dried processing banana were collected from the farmers' farms, market centers, women communes, and drying dealers in the Chumphon province. The study and research were conducted for 3.5 years starting from June 1997 to December 2000.

3. Results and Discussion

3.1 The farmer's farms: From our survey we found that the farmers would grow the Leb Mue Nang in three cropping types: Firstly, as mono culture cropping. Very few of farmers had grown Leb Mue Nang by this cropping type. Nearly all yield product was sold to the factories, and the little remaining was sold to the markets. Moderate cultural practices, i.e. application of irrigation water and fertilizer had been done. Yield obtained from this cropping type was considerably high, uniform, and of good quality. Secondly, as mixed cropping. This cropping type, the Leb Mue Nang would be grown together with the other main crops, coconut, oil palm, and para rubber. No cultural practice would be done, thus yield obtained was not uniform, of low quality, and low. Finally, as intercropping. In this cropping type, the Leb Mue Nang would be grown between the young small main fruit tree rows, specifically durian. After 4-6 years, or when the main fruit trees grew up, the farmers would cut down the Leb Mue Nang.

Table 1 : Original planting areas and certain agronomic characteristics of 15 Leb Mue Nang cultivars used in the trial

Cultivar No.	Original planting areas	Certain characteristics
01	Langsuan, Chumphon	green-purple sheath, no hair
02	Langsuan, Chumphon	green-purple sheath, no hair
03	Promkiri, Nakornsrithammarat	green-purple sheath, with hair
04	Promkiri, Nakornsrithammarat	green-purple sheath, with hair
05	Promkiri, Nakornsrithammarat	green sheath, with hair
06	Langsuan, Chumphon	purple sheath, no hair
07	Langsuan, Chumphon	purple sheath, no hair
08	Langsuan, Chumphon	green-purple sheath, no hair
09	Langsuan, Chumphon	purple sheath, no hair
10	Apong, Pung-nga	purple sheath, no hair
11	Apong, Pung-nga	green-purple sheath, no hair
12	Apong, Pung-nga	green-purple sheath, no hair
13	Muang, Puket	purple sheath, no hair
14	Muang, Puket	purple sheath, with hair
15	Muang, Puket	purple sheath, with hair

Neither water nor fertilizer were applied directly to the Leb Mue Nang, but the banana would receive the excess water and fertilizer indirectly from those that the farmers had applied to the main fruit trees. Yield obtained from this cropping type was not uniform and of low quality.

3.2 The Experimental Plots: With systemic planting in 3x2 meters row spacing, regular applications of water and fertilizers, and control of weeds, the data showed that the 15 cultivars could grow well and began flowering at about 6-7 months and could harvest fruit bunches at about 9-10 months after planting. All cultivars could produce high yield with good quality bunches and hands.

Compared to the farmer's farm, the data pointed out clearly that the moderate cultural practices as had been utilized in the experimental plots had highly significant effects on growth, yield, and quality of the Leb Mue Nang. The data indicated that to grow the Leb Mue Nang for high yield with high quality, it is necessary to provide moderate to high cultural practices. Nevertheless, to insist the farmers provide a moderate cultural practice to their Leb Mue Nang banana was a serious problem and very difficalt to do. The reasons were (1) the farmers owned a few acres of land, (2) the farmers in general, preferred to grow many kinds of crops in one area at the same time, and (3) the price of Leb Mue Nang was low and fluctuated, when compared to the other staple crops. Virtually, from our studies we found that if we could insure the price of Leb Mue Nang at 100 fruits/20 baht and the price of Monthong durian at 25 baht/ kilogram, growing Leb Mue Nang could give higher return than growing Monthong durian. Besides, growing Leb Mue Nang was much safer to the farmers, consumers, and environments than growing durian or other fruit trees.

3.3 Drying Techniques and Quality of Products: The climate of Chumphon and the other provinces in the south has a lot of sunshine and is very hot, but because of heavy rainfall and high humidity all year round, it is not possible to dry the banana by natural sunlight. The banana has to be dried in one of three oven types: (1) in the oven type that heat source comes from burning wood or coconut leaves or coconut shells, (2) in the oven type that heat source comes from burning charcoal, and (3) in the oven type that heat source comes from burning cooking gas.

Table 2 : Plant height and culm diameter at flowering, number of hands/bunch, number of fruits/hand, size of fruit, and fruit in hand orientation of the 15 Leb Mue Nang cultivars from the experimental plots

Cultivar No.	Plant Ht. (cm)	Culm Diameter (cm)	Number of hands/bunch	Number of fruits/hand	Fruit size[1]	Orientation
01	195.60	50.00	9-12	14-18	M-L	good
02	198.00	45.70	8-12	14-18	M-L	good
03	200.10	48.50	7-11	14-18	M-L	good
04	208.00	54.00	8-11	14-18	M-L	good
05	206.00	51.50	8-11	13-17	M-L	satisfactory
06	200.00	45.00	9-12	14-18	M-L	good
07	197.00	51.00	7-11	14-18	S-M	satisfactory
08	196.00	48.00	7-11	14-18	S-M	good
09	206.00	45.00	9-12	14-18	S-M	satisfactory
10	210.00	46.00	8-11	12-16	M-L	good
11	220.00	45.60	8-11	12-16	S-M	unsatisfactory
12	218.10	49.00	9-13	14-18	M-L	good
13	208.00	46.00	7-11	14-18	M-L	good
14	224.00	50.00	7-11	14-18	S-M	satisfactory
15	220.00	46.10	8-12	14-18	M-L	satisfactory

1 S = small size, shorter than 8 cm., M = medium size, 8-12 cm.
L = large size, longer than 12 cm.

The drying techniques used by the three oven types are quite similar. The drying techniques are as follows:

(1) Preparation of banana. The ongoing dried banana had to be the full ripe stage but not over ripe with no black rot spot on fruit. The unripened banana would yield a pale appearance after drying, whereas the over ripe or black rot spotted banana would become dark brown-black after drying. The ongoing dried banana would be peeled out and then soaked in the 0.1% salt-water for 1-2 hours in order to enhance better appearance and taste. After soaking, the bananas are taken from the salt-water and laid on the drying screen.

(2) Drying. The temperatures used to dry bananas were between 95 and 105 degrees C. After drying at this temperature for ten hours, the bananas are taken off of the heat source and left to cool for 14 hours. Then the bananas are dried and cooled in this fashion for two more cycles. During each round of cooling, the drying bananas would be pressed slightly by hand or by wooden rollers to make good shape of drying bananas. For some producers, during the last cooling the drying bananas would be soaked in the honey syrup for 1-2 hours before the last drying. This would be enhance their appearance, improve taste, and yield a higher price for the dried bananas.

3.4 Selection of Cultivars: The data in Table 2 and 3 pointed out that all cultivars were desirable to use for dried processing. All cultivars had good appearance and high score for taste at 3.5 to 4.0. Only six cultivars were found to be suitable for direct consumption. They are: numbers 01, 02, 06, 08, 10 and 12. These cultivars produced high yield, had good orientation of hands and fruits in hand, had good appearance and good taste fresh fruits and dried processing fruits. Since the farmers prefered to grow Leb Mue Nang both for direct consumption and for dried processing, the cultivars that should be recommended to the farmers are the cultivars 01, 02, 06, 08, 10 and 12.

4. Summary

The research was aimed at selecting the cultivars of Leb Mue Nang banana for direct consumption and dried processing. The research

Table 3 : Colour appearance of the ripe fruit, canalized score of the ripe fruit, taste score of the fresh fruit, and taste score of the dried processing fruit

Cultivar No.	Colour appearance of the ripe friut[1]	Canalized score of the ripe fruit[2]	Taste score of the ripe fruit[3]	Taste score of the dried fruit[3]
01	6A-6B	3.5	3.5	3.5
02	6A-6B	4.0	4.0	3.5
03	16A-16B	2.5	3.5	3.5
04	16A-16B	2.5	3.5	3.5
05	16A-16B	2.5	3.5	4.0
06	6A-6B	3.5	3.5	3.5
07	6A-6B	3.5	3.5	3.5
08	6A-6B	4.5	4.0	4.0
09	6A-6B	4.0	4.0	3.5
10	6A-6B	4.5	3.5	3.0
11	6A-6B	4.0	3.5	3.5
12	6A-6B	4.0	4.0	3.5
13	6A-6B	4.0	4.0	3.5
14	16A-17A	2.5	3.5	4.0
15	16A-17A	2.5	3.5	4.0

1 colour as compared to RSH London Colour Chart
2 scores 5 = excellent 4 = good 3 = satisfactory 2 = unsatisfactory 1 = rejected
3 scores 5 = very much preference 4 = much preference 3 = satisfactry 2 = unsatisfactory 1 = rejected

was conducted in the Chumphon province during the years 1997-2000. The results indicated that all cultivars were desirable to grow for dried processing, and only 6 cultivars, (01, 02, 06, 08, 10, and 12) were desirable to be grown for direct consumption and for dried processing.

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