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Essential oil production in
the highlands of northern

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APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

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OF NORTHERN THAILAND

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INSON KLONG-KARN-NGARN
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By Kwanyeun Wichapan*, Inson Klong-karn-ngarn*, and
Narong Chomchalow*

SUMMARY

This third semi-annual report on the "Essential oil production in the highlands of northern Thailand project" covers the work at ASRCT's Essential Oil Research Station which includes the collection of fourteen species of essential oil crops, varietal studies of six species which are kek huai Chrysanthemum morifolium, Lavandula vera, L. hybrida, Mentha cardiaca, M. piperita and M. spicata, and investigation on the proper cultural practice of four species which are Eucalyptus globulus, E. smithii, Lavandula vera and Mentha arvensis. A portable steam distillation is introduced to the Station and run with high efficiency. A laboratory room for distilling apparatus are being prepared.

INTRODUCTION

Since the objective of this project is to investigate the essential oil crops for hill-tribes to substitute opium growing as mentioned in the previous reports, quite a few of species had been grown to observe their adaptability at ASRCT's Essential Oil Research Station, Chang Khian. Up to the present, the most promising crop that has been found out is kek huai (Chrysanthemum morifolium). The dried-flower product qualities are comparable to the imported ones from China. Improvement of the drying method is being developed. Since four species, viz. Eucalyptus globulus, E. smithii, Lavandula vera, and Mentha arvensis exhibited good adaptability to the highland conditions, the experiment on these plants were planned and started during this period.

This report covers the works performed during the period October 1975 to February 1976.

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Collection of plant materials

Fourteen species of essential oil crops existed at the station are listed below:

Chrysanthemum morifolium

Cymbopogon nardus

Eucalyptus globulus

E. smithii

Lavandula vera

L. hybrida

Mentha arvensis

M. cardiaca

M. carnadensis

M. piperita

M. spicata

Pogostemon sp.

Rosa damascena

Veteveria zizanioides

Varietal study on essential oil crops

Six species of essential oil crops were investigated on their adaptability to soil and climatic conditions, agronomic characters, and pest and disease resistance. The oil content was also studied.

1) Chrysanthemum morifolium. Kek huai cuttings were planted on 14 June 1975. Flowering was observed at 77 days after planting. Yield of fresh flowers in the first harvesting period collected from 23 October to 30 December 1975 was 110.4 kg per rai (690 kg per ha). Higher production is expected to be obtained in the next season beginning from March. Flowers were dried in the shade to reduce moisture content to 12.73%. The dehydrated flower was 16.5% of the fresh one and the essential oil content is 0.2% on wet weight basis by petroleum ether extract.

2) Lavandula vera. Two thousand lavender seedlings were planted at spacing 50 cm within and between rows on 29 September 1975. The plant height was measured once a month. The first measurement done on 29 January 1976 indicated an average 8.15 cm in height. Age of flowering, disease, pest, yield and productive life will be observed. A

stainless steel steam distillation with a capacity of 10 kg fresh material is available for distillation and ready for delivery to the Station.

3) Lavandula hybrida. Nine Lavandin plants were grown on 21 April 1975 with spacing 50 cm within and between rows. The adaptability of plants to the soil and climatic conditions was good. No disease or insect pest was seen. The average height of plants was 29.5 cm and the diameter of bush was 33 cm as recorded in December 1975.

4) Mentha cardiaca. Scotch mint which was transplanted on 26 July 1975 in an area of 32 m² as mentioned in Report No. 2 was harvested on 20 January 1975 due to wilt disease and defoliation. Yield of fresh material was 8 kg per 32 m² (2,500 kg/ha).

5) Mentha piperita. Two varieties of pepper mint were planted in the experimental plots to investigate their adaptability, age at harvesting, yield of fresh material, oil content, and quality of oil.

Pepper mint 'Indonesia' was transplanted on 26 July 1975 in a plot of 38.4 m². Rate of growth was poor due to defoliation. It was harvested at 178 days after planting. Yield of fresh material was 4.5 kg per 38.4 m² (1,171.87 kg per ha). Pepper mint rust was seen during January to February.

Pepper mint 'Italy' No. 2 was transplanted to the experimental plot of 38.4 m² on 26 July 1975. Growth rate was fair. It was harvested at 178 days after planting. No flower was seen at the time of harvesting owing to short day length. Fresh material production was 8.6 kg per 38.4 m² (2,291.6 kg per ha).

6) Mentha spicata. Three varieties of spear mint were planted in the experimental plots on 26 July 1975 and harvested at 178 days after planting due to defoliation. No flower was observed at the time of harvest.

Spear mint 'Israel' grew well in the experimental plots. Rate of growth was rather good; it yielded 15 kg per 38.4 m² (3,906.25 kg per ha) of fresh material.

Spear mint 'US. No. 1' grew poorly. The production of fresh material was only 9.5 kg per 32 m² (2,656.25 kg per ha).

Spear mint 'US. No. 2' was very poor in growing. The yield of fresh material was only 5 kg per 38.4 m² (1,302.08 kg per ha).

Investigation on proper cultural practices

1) The effect of fertilizer application on Mint So No 1. This experiment has been done since 14 June 1975 as mentioned in Report No. 2. They were harvested twice on 17 September 1975 and 19 January 1976. The yields of fresh material obtained from fertilized plots were 206.2 kg per 144 m² (14,319 kg per ha) and from non-fertilized plots, 105.7 kg per 144 m² (7,340 kg per ha). The next harvesting will be done in May 1976 to complete one year production. The fresh material products were distilled by using the ASRCT portable still, capacity 50 kg of fresh material, which was available at the Station to determine their oil yield. Statistical analysis of this experiment will be done after the harvest of the last crop in May 1976.

2) Trial on proper spacing of Eucalyptus grown for essential oil production. The experiment was started by germinating seeds of two species, Eucalyptus globulus and E. smithii in three spacings: 25, 50 and 100 cm within row, and 100 cm between rows as the main plots of 8 x 12 m. The treatment on species will be treated as subplots with a size of 4 x 4 m. Leave and young twigs in each subplot will be cut and distilled to determine the oil percentage and oil yield per unit area.

3) Trial on rate of nitrogen fertilizer application to lavender. The trial was started in January 1976. Germination of Lavandula vera seeds in seed beds was done. A randomized complete block design will be used with four replications. Size of block will be 4.5 x 18 m and the plots for each treatment will be 4.5 x 4.5 m. Three rates of nitrogen fertilizer, 31.25, 62.5 and 93.75 kg per hectare, shall be applied at every four months together with 62.5 kg per hectare each of P and K. The plants will be spaced at 45 cm within and between rows. One thousand and six hundred seedlings will be planted in this experiment. After a year in the plots, alternate plants and rows will be removed to give a spacing of 90 cm of both directions. Four hundred plants will be maintained finally.

Distillation

An ASRCT portable steam distillation, capacity 50 kg of fresh material, is already available at the Station. The herbs of Japanese Mint 'So Wo 1' and Pepper Mint 'Italy No. 2' were distilled. A laboratory room has been prepared for distillation at the Station.

CONCLUSION

The works at Essential Oil Research Station, Chang Khian Site B, have been going on without any serious problem. Fourteen species of essential oil crops were collected. The newly introduced species were Rosa damascena, Eucalyptus globulus, and E. smithii. Unfortunately, Pelagonium spp. is not possible for introduction because such an attempt is forbidden by countries of cultivation. Kek huai (Chrysanthemum morifolium) exhibited vigorous growth and promising production. Its dried-flower quality is accepted by the consumers and Chrysanthemum tea producers. The lavender seed gave high germination percentage and vigorous seedlings. They were transplanted for varietal study and trial on N fertilizer application. For all kinds of mints growing at the Station, Mint 'So Wo 1' exhibited the highest yield (14.319 tonnes per ha in 8 months) and the Spear Mint 'Israel' yielded the second (1.562 tonnes per ha in 7 months). The others showed inferior production. From observation, Rosa damascena grew slower on their own root as compared with that found in the lowland. To solve this problem, suitable root stock has to be selected. Distillation had been done on pepper mint and Mint 'So Wo 1' at the Station.