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Essential oil production in
the highlands of northern

APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

MISCELLANEOUS INVESTIGATION NO. 85
ESSENTIAL OIL PRODUCTION IN THE HIGHLANDS
OF NORTHERN THAILAND

REPORT NO. 2
ESSENTIAL OIL PRODUCTION IN THE HIGHLANDS
OF NORTHERN THAILAND

BY

NARONG CHOMCHALOW

KWANYUEN WICHAPHAN

ASRCT, BANGKOK 1975

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By Narong Chomchalow* and Kwanyuen Wichaphan*

SUMMARY

This second 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 and multiplication of plant materials, varietal study, investigation on the proper cultural practices and distillation of essential oil crops. Eleven species of essential oil plants both introduced from abroad and from local sources were multiplied. Two varieties of M. piperita, three varieties of M. spicata, and one variety of Kek Huai (Chrysanthemum spp.), a Chinese essence, were transplanted from the nursery to the experimental plots for varietal study. The study on fertilizer application on Japanese Mint, Variety So Wo 1, is going on. Laboratory trial on distillation was attempted on several species.

INTRODUCTION

After the contract No. 12-14-0605-12 was signed between ASRCT and USDA on 20 May 1974, the first Semi-annual Report on the "Essential oil production in the highland of the northern Thailand project" was sent to the USDA in April 1975 by ASRCT. The main purpose of this project is to investigate the essential oil crops for hill-tribes to substitute opium growing as has been mentioned in the Semi-annual Report No. 1. It is expected that the result of work to be carried out at ASRCT's Essential Oil Research Station would be comparatively fruitful.

This report covers the works performed during the period May to September 1975.

ASRCT'S ESSENTIAL OIL RESEARCH STATION

ASRCT's Essential Oil Research Station is located at Doi Chang Khian, about 12 km from Phu Phing Palace in the north direction, or about 30 km from downtown Chiang Mai. The total area is 7 rai (about 3 acres) at the elevation of 1,260 m. About half of the land is flat or gently sloping

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and the rest is on a rather steep slope. The texture of soil on the flat plain is sandy loam, having the following characteristics: pH 5.4, with organic matter 47%, phosphorus 36 p.p.m., potassium 240 p.p.m. On the slope, the following data were obtained: pH 5.9, organic matter 4.79%, phosphorus 8 p.p.m. and potassium 508 p.p.m.

Mr. Inson Klong-karn-ngarn has been appointed to be the Manager of the Station on 2 April 1975. The establishing of the Station was begun from the acquisition and preparation of land, construction of road from UNFDAC site B to the Station, office building and preparation of 12 experimental plots with an area of 400 m² each.

Works that have been done on the Station are as follows:

1) Collection and multiplication of plant materials. Propagating materials of essential oil plants both introduced from abroad and from local sources were planted in the nursery rows. The list of species and detailed information is tabulated as follows:

| <u>Species</u> | <u>Introduced from</u> | <u>Name & address of introducer</u> | <u>Date received</u> | <u>Date of planting</u> | <u>Area (m²)</u> |
|----------------------------------|-----------------------------|--|----------------------|-------------------------|-----------------------------|
| 1. <u>Mentha piperita</u> | | | | | |
| Peppermint Indonesia | Indonesia | Dr. Narong Chomchalow ASECT | 6 Jul.74 | 26 Apr.75 | 3 |
| Peppermint Italy No. 1 | Reggio Calabria Italy | Dr. Narong Chomchalow ASECT | 6 Jul.74 | 6 Apr.75 | 3 |
| Peppermint Italy No. 2 | Florence Italy | Mr. Piraj Loaw- haphan, Agr. Attache, Royal Thai Embassy, Rome | 15 Feb.75 | 6 Apr.75 | 9 |
| 2. <u>M. spicata</u> | | | | | |
| Spearmint U.S. No. 1 | U.S.A. | W.E. Manis USDA Official Chiang Mai U.S. Consulate | Jun.74 | 21 Apr.75 | 5 |

| <u>Species</u> | <u>Introduced from</u> | <u>Name & address of introducer</u> | <u>Date received</u> | <u>Date of planting</u> | <u>Area (m²)</u> |
|-------------------------------------|--|---|----------------------|-------------------------|-----------------------------|
| Spearmint Israel | Israel | N. Chomchalow | 28 Aug.75 | 21 Apr.75 | 6 |
| Spearmint Italy No. 1 | Reggio Calabria Italy | N. Chomchalow | 6 Sep.74 | 26 Apr.75 | 3 |
| Spearmint Italy No. 2 | Florence Italy | Mr. Piraj Loawhaphan | 15 Feb.75 | 23 Apr.75 | 2 |
| Spearmint U.S. No. 2 | Indiana U.S.A. | Mr. Chaisin Maneeant ASRCT | 26 Nov.74 | 9 Jul.75 | 8 |
| 3. <u>M. cardiaca</u> Scotchmint | U.S.A. | W.E. Manis | Jun.74 | 21 Apr.75 | 13 |
| 4. <u>M. canadensis</u> | Industrial Crops Res. Inst., Bogor, Indonesia | N. Chomchalow | 6 Jul.74 | 21 Apr.75 | 7 |
| 5. <u>M. arvensis</u> | Industrial Crops Res. Inst., Bogor, Indonesia | N. Chomchalow | 6 Jul.75 | 21 Apr.75 | 4 |
| Indian x Japanese Hybrid | ASRCT | N. Chomchalow | 6 Jul.74 | 21 Apr.75 | 4 |
| So Wo 1 | ASRCT | N. Chomchalow | 21 Apr.75 | 21 Apr.75 | 48 |
| 6. <u>Lavendula vera</u> | France | W.E. Manis | 22 Apr.75 | May | 2 germinating boxes |
| 7. <u>Lavendula hybrida</u> | Reggio Calabria Italy | N. Chomchalow | 6 Sep.74 | 21 Apr.75 | 8 plants |

| <u>Species</u> | <u>Introduced from</u> | <u>Name & address of introducer</u> | <u>Date received</u> | <u>Date of planting</u> | <u>Area (m²)</u> |
|---|--|---|----------------------|-------------------------|-----------------------------|
| 8. <u>Cymbopogon nardus</u> (citronella) | ASRCT | Mr. Smorn Prompech ASRCT | 2 Apr.75 | 21 Apr.75 | 360 plants |
| 9. <u>Pogostemon</u> spp. (patchouli) | ASRCT | S. Prompech ASRCT | 2 Apr.75 | 21 Apr.75 | 20 plants |
| 10. <u>Vetiveria zizanioides</u> (vetiver) | ASRCT | S. Prompech | 2 Apr.75 | 21 Apr.75 | 10 plants |
| 11. <u>Chrysanthemum</u> spp. | Musoe Agr. Exp. Sta., Tak Province | Mr. Inson Klong-karn- ngarn | 21 Apr.75 | 21 Apr.75 | 6 |

2) Varietal study on essential oil crops

The species and/or varieties from item 1 which have been propagated and multiplied in nursery rows were transplanted in the experimental plots in order to investigate their growth, age of harvesting, yield of fresh weight and oil per acre, and quality of oil. The promising varieties and/or species will be selected for further study on their proper cultural practices. Up to the present, four species are growing for this purpose. Methods of planting are described as follows:

2.1 Mentha piperita. Two strains of peppermint, designated as Peppermint Indonesia and Peppermint Italy No. 2, were planted on 26 July 1975 by using stolons 4-5 inches long as planting materials. Eight plots, of 1.20 x 3.50 metres each, were used for each variety. Spaces between individual plants and rows were 50 cm. Fertilizer, formula 15-15-10 at the rate of 50 kg per rai, was applied at the time of planting.

2.2 M. spicata. Three varieties of spearmint, designated as Spearmint U.S. No. 1, Spearmint U.S. No. 2, and Spearmint Israel, were planted on 26 July 1975. Stolons 4-5 inches long were used as planting materials. Eight plots, of 1.20 x 3.50 metres each, were planted to each variety. Spaces between individual plants and rows were 50 cm. Fertilizer, formula 15-15-10, 50 kg per rai, was applied at the time of planting.

2.3 M. cardiaca. One variety, designated as Scotchmint, was planted on 26 July 1975. Method of planting, spacing, size and number of plots for planting were the same as in 2.1.

2.4 Chrysanthemum spp. The oil extracted from the flowers may be used in pharmaceutical as heart stimulant or in perfumery. Dried flowers are well-known by the Asian people as Chrysanthemum tea for making beverage. It can be sold at high price of about 150-200 baht per kg.

The cuttings were grown on 13 June 1975 in an area of 1/4 rai. Spaces between rows and individual plants were 50 cm. Fertilizer formula, 15-15-10, at the rate of 50 kg per rai, was applied at one month after planting.

3) Investigation on the proper cultural practice

3.1 The effect of fertilizer application on Mint, So Wo 1 variety.

The design use in this experiment is randomized complete block with 6 replications. Twelve plots, 1 x 24 m each, were planted on 14 June 1975. Spaces between individual plants and rows were 50 cm. Two rows of plant on each plot were set. Fifty kilogrammes per rai of fertilizer, formula 15-15-10, was applied on 15 July 1975.

4) Distillation

Two species, Mentha spicata from Israel and M. cardiaca were harvested at flowering stage, and brought to ASRCT for distillation of oil in order to determine their percentage and quality.

CONCLUSION

The Essential Oil Research Project is mainly done at ASRCT Essential Oil Research Station at Doi Chang Khian, Chiang Mai without any serious problem. The soil analysis was made and the experimental plots had been prepared. Eleven species of the essential oil plants were collected and multiplied. Most of them showed vigorous growth and high adaptability according to the suitability of soil and climatic conditions. Since small amount of plant materials were introduced, it takes a period of time to multiply these species and/or varieties to have enough for further experiment and distilling process to determine the quality and percentage

of oil. However, two species, Mentha spicata and M. cardiaca, which exhibited vigorous growth, were harvested and distilled at ASRCT Laboratory; others will be done at a later date depending on their rate of growth. When most of the crops reach harvesting period, distilling apparatus will be duly installed at the Station.

Pelargonium spp. and Rosa damascena are going to be introduced as essential oil crops for perfumery; propagating materials have already been ordered from abroad.