

ADAPTABILITY STUDIES OF SOME MEDICINAL AROMATIC PLANTS IN ANTARCTICA

M.K. Pant and Narendra Kumar

Defence Agricultural Research Laboratory

Abstract

A study on adaptability of some medicinal aromatic plants viz., Peppermint (*Mentha piperita*), Ban aj wain (*Thymus serpyllum*), Indrayan (*Citrullus colocynthis*), Tulsi (*Ocimum sanctum*), Tagar (*Valeriana wallichii*), Pudina (*Mentha spicata*), Brahma Kamal (*Scoussusia obvallota*), Adrak (*Zingiber officinalis*), Keshar (*Crocus sativus*), Sun flower (*Helianthus annuus*), Ashwa gandha (*Withania somnifera*) Kalijiri (*Carum carvi*), Amla (*Emblica officinalis*), Reetha (*Sapindus mukorossi*) & Brahmi (*Centrella asiatica*) was carried out in polar-summer of 1996. The plants were grown in peat moss. Except Amla, Brahmi & Reetha all plants responded very well and maintained a good growth. Germination period of Peppermint, Ban ajwain, Indrayan, Pudina & Sunflower was found quite early i.e. 5-6 days after sowing. In 30 & 40 days duration Pudina plant attained highest Plant height 15cm & 20 cm, respectively; followed by Kalijiri (12cm & 15 cm) & Ban ajwain (12cm & 18 cm). Lowest growth was recorded in Keshar (4 cm & 8 cm), Tulsi (6 cm & 10 cm) & Sunflower (6 cm & 10 cm).

Introduction

Antarctica, the icy continent of the world, occupies an area of 14 million sq kms; 98% of the continent is covered with snow and only 2% area is snow free. Some plants such as lichens, moss, algae (viz., Prasiola, Nostoc) and two vascular plants, a grass *Deschampsia antarctica* and *Colobanthus quitensis* are native of this region. Due to adverse climatic conditions and lack of nutrients in Antarctic soil, these plants have a very limited growth. The research programme, 'Polar Horticulture' was started by Defence Agricultural Research Laboratory, Pithoragarh during 5th Indian Scientific Expedition to Antarctica. The growth and yield of different vegetable varieties under protected conditions was successfully studied. After getting success in vegetables cultivation programme, an experiment was planned to find out adaptability studies of some medicinal, aromatic plants during 15th Indian Scientific Expedition to Antarctica, to find out growth performance of some important medicinal plants.



Fig. 1: Medicinal plants grown in glass house

Materials and Methods

The experiment was conducted in Indian research station, 'Maitri', in a glass house having an area of 26.07 m². Out of this area, 3 m² area was utilised for this experiment. Temperature was maintained by heat convectors and humidity by humidifiers. The natural light, along with artificial lights, was utilised for plant growth. During the study, temperatures were recorded to be 10°C to 34°C inside the glass house. The outside temperatures were -12°C to 0°C and humidity was recorded as 10% to 84%.

Seeds of 14 medicinal aromatic plants were sown in peat moss on 3.1.96. in a long wooden tray (Fig.1). Data on date of germination, plant height in 30 days & 40 days and root length were recorded.

Results and Discussion

Table-1 indicates comparative date of germination, plant height and root length. It is evident from the table that Piper mint, Indrayan, has taken minimum germination time (5 days), followed by Ban ajwain, Pudina and Sunflower (6 days). Date of germination was found to be longest in Reetha and Keshar, 13 days and 12 days, respectively. After 30 days, maximum plant height (15 cm) was recorded in Pudina plant followed by Kalijiri and Ban ajwain (12 cm each), lowest plant height (4 cm) was recorded in Keshar plant. After 40 days,

Table-1: Data on different growth characters of some medicinal/aromatic plants

| Sl.No. | Common name | Botanical name | Date of sowing | Days taken to germinate in Antarctic conditions | Plant height after 30 days (cm) | Plant height after 40 days (cm) | Root length after 45 days (cm) | Uses |
|--------|--------------|-----------------------------|----------------|---|---------------------------------|---------------------------------|--------------------------------|---|
| 1. | Piperment | <i>Mentha piperita</i> | 3.1.95 | 5 | 10 | 14 | 7 | E. oil used in cold and headache |
| 2. | Ban ajwaime | <i>Thymus serpyllum</i> | 3.1.95 | 6 | 12 | 18 | 6 | E. oil used in ferns, Pain killer massage cream. |
| 3. | Indrayan | <i>Citrus colocythis</i> | 3.1.97 | 5 | 8 | 13 | 8 | Used as purgative in fever. |
| 4. | Tulsi | <i>Ocimum sanctum</i> | 3.1.95 | 7 | 6 | 10 | 7 | Used in cough and cold on. |
| 5. | Tagar | <i>Valeriana wallichii</i> | 3.1.95 | 7 | 10 | 15 | 6 | Used in stimulant. |
| 6. | Pudina | <i>Mentha spicata</i> | 3.1.95 | 6 | 15 | 20 | 5 | Used in stomach disorder and gastric trouble. |
| 7. | Brahma Kamal | <i>Saussuria obvallata</i> | 3.1.95 | - | - | - | - | Its oil used in mental order cuts & burns. |
| 8. | Adrak | <i>Zingiber officinalis</i> | 3.1.95 | 10 | 6 | 10 | 4 | Used in cold and throat problem |
| 9. | Keshar | <i>Corcus sativus</i> | 3.1.95 | 12 | 4 | 8 | 4 | Used as tonic. |
| 10. | Sunflower | <i>Helianthus annuus</i> | 3.1.95 | 6 | 10 | 23 | 8 | Oil is good for heat patients. |
| 11. | Ashwa gandha | <i>Withania somnifera</i> | 3.1.97 | 7 | 8 | 14 | 5 | Root used as tonic, It has sedative action on nerves. |
| 12. | Kaljiri | <i>Carumcurvi</i> | 3.1.95 | 7 | 12 | 15 | 4 | Oil is used in toothache. |
| 13. | Amla | <i>Embllica officinalis</i> | 3.1.95 | 10 | 10 | 14 | 3 | Used in tonics, cough; its oil is good for hair. |
| 14. | Rectha | <i>Sapindus mukoossi</i> | 3.1.95 | 13 | 7 | 10 | 2 | Used in cough and skin diseases. |
| 15. | Brahmi | <i>Centrella asiatica</i> | 3.1.95 | 6 | 10* | 16* | 6 | Used as tonic, memory enhancement blood purifier. |

lowest plant height (4 cm) was recorded in Keshar plant. After 40 days, maximum plant height (23 cm) was found in Sunflower plant followed by Pudina (20 cm), while Keshar plant recorded lowest plant height (8 cm). Root lengths were measured after 45 days. Longest root (8 cm) was found in Sunflower and Indrayan followed by 7 cm in Tulsi plant, lowest root length was recorded (2 cm) in Reetha plant. Earlier workers (Dhaulakhandi *et al.*, 1995; Joshi, 1995) reported similar type of variation in plant growth parameters on vegetable crops in Antarctica.

Other characters could not be recorded due to shortage of time. From the above study we can conclude that Brahmi plant, Reetha and Amla have not responded well; whereas other medicinal and aromatic plants were found healthy in vigour i.e. well adapted to protected conditions in Antarctica. Green house technology is successful for vegetable-growing as well as for medicinal plants' cultivation in Antarctica. Greenery in such a remote and barren area also provides great psychological boost to the expedition members.

Acknowledgements

I am highly thankful to Dr. Narendra Kumar, Director, DARL Pithoragarh, who provided this great opportunity to me for participating in the 15th Indian Scientific Expedition to Antarctica and Mr. U.C. Joshi for typing this manuscript. I am also thankful to SA to RM and Director ABAS, DARDO, HQ and Adviser (Life Sciences), New Delhi. My sincere thanks are due to Deptt. of Ocean Development for providing me necessary facilities in Antarctica and to other expedition members who helped me in various ways. Help rendered by Shri H.K. Pandey in preparation of this manuscript is also thankfully acknowledged.

References

- Dhaulakhandi, A.B., Joshi, R.P. & Joshi, M.C. (1995) A study on Growth and Development of Five Leguminous Plant Species in Antarctic soil, During Polar Day, Scientific Report of Xth Indian Scientific Expedition to Antarctica, Department of Ocean Development, Govt. of India, New Delhi, Technical Publication No.8, 209-217.
- Dhaulakhandi, A.B., Joshi, R.P. & Joshi M.C. (1995) Growth and Yield of Fenugreek, Spinach, Coriander & Lettuce Under Continuous Day Light Condition in Antarctica, X Indian Scientific Expedition to Antarctica, Department of Ocean Development, Govt, of India, New Delhi, Technical Publication No. 8,195-208.
- Joshi, R.P. (1995) Polar Horticulture Report of Tenth Antarctic Expedition, X Indian Scientific Expedition to Antarctica, Department of Ocean Development, Govt, of India, New Delhi, Technical Publication No. 8, 231-249.

Joshi, M.C. & Banerjee B.K., (1988) Prospects of Horticulture in Antarctica, Scientific Report of V Indian Scientific Expedition to Antarctica, Department of Ocean Development, Govt, of India, New Delhi, Technical Publication No. 5,473-87.

Walls, I.G. (1983). The complete book of The Green house, World Book Ltd., London, 159-184.