

Propagation of *Tagetes minuta* (Wild Marigold) and extraction of its oil for sale.

Background: Although *Tagetes minuta* (Wild Marigold) naturalized as a weed in different parts of the world, it has now been globally recognized as an important species which is valued for the essential oil present in its leaves and flowers. It is an aromatic, branched, erect, 1-2 m tall annual herb which gives higher oil yield of better quality among all the cultivated *Tagetes* species. This oil finds a good market in perfumery houses and flavor industry. The flower oil and its absolute are used for compounding of high grade perfumes in flavor and food products including cola and alcoholic beverages, frozen dairy desserts, candy, baked goods, puddings, condiments etc. In addition, the oil is also known to possess biological activity which has future scope in pharmaceutical industries.

This species finds habitat in Western Himalaya between altitudes of 1000-2500 m. The states of Himachal Pradesh, J&K and hills of Uttarakhand are the main growing regions. Better quality of essential oil is produced in moist temperate regions where nights are cool during growth and flowering season of the plant. Average temperature of (12-30)°C during reproductive phase of the crop is desired for good quality essential oil. The crop prefers slightly acidic soil (pH-5.5 to 7.0). A well drained sandy loam to clay loam soil having sufficient humus favours plant growth. Keeping in view the suitable agro-climatic conditions, the propagation of this species is initially proposed to be undertaken in Mandi, Banjar and Theog Forest Divisions. Subsequently, it will be replicated in other appropriate project areas.

Scheme: SHGs/CIGs of interested families will be formed to take up its propagation on private land. Further, the scheme may be extended to PFM areas as per availability, suitable soil and water source. Marketing will be carried out by the marketing committee set up at Cluster level of VFDS and under the aegis of Manager (Marketing) from PMU.

Activities: The Institute of Himalayan Bioresource Technology (IHBT), Palampur has developed production technology package of this crop. As per the terms and conditions of MoU signed between PMU JICA and IHBT-Palampur, the necessary technical support along with procurement of planting material will be obtained from this institute.

Propagation technology: *T. minuta* is a seasonal crop propagated by seeds. Crop can be raised by direct seed sowing. The duration of crop varies from 4-6 months.

Main crop practice (mild temperate to temperate climate): This standard crop practice is most suitable for the production of *Tagetes minuta* in the mid hills of Western Himalaya. The crop is cultivated in mid-June and harvested during the period of mid-October, November. Removal of apical meristem in mid-August is essential to check the erect growth and promote lateral branches. Proper drainage of excess rain water is necessary to avoid water logging in crop fields.

Direct sowing: The soil should be thoroughly prepared by disc ploughing, harrowing and planking. Compost or farmyard manure (FYM) as per the site will be mixed well into the soil a couple of days before seed sowing. A pre-sowing irrigation should be given prior to seed sowing. Seeds of this plant are light and small in size weighing about 1000 seeds/g. About 2.5 kg seeds/ha are required to obtain optimum plant population. Seeds should be sown at 1-2 cm soil depth and evenly distributed in well prepared soil. Deeply sown seeds fail to germinate. For proper distribution, seeds may be mixed with other bulky materials like well rotten fine and dry compost, sand, rice husk, sawdust, ash etc. Seed broadcasting or line sowing method may be adopted. Plant to plant spacing of 15-30 cm and row to row spacing

of 30-45 cm is suggested for line sowing. Seed germination is completed between 10-15 days after sowing.

Costs involved: Estimated projections have been broadly worked out as below:

No.	Activities	Units	Quantity	Norms	Cost
1	Constitution of CIG from VFDS	1			
2	Area	ha	1		
3	Cost of Planting Material (Seeds)	kg	2.5	1500	3,750
4	Agricultural Implements	LS		LS	7,000
5	Manure and NPK including carriage	LS		LS	50,000
6	Distillation Unit including installation	LS		LS	600,000
7	Cutter and Choppers	LS		LS	10,000
8	Amber colored Glass Bottles (5 L capacity and 10 No.) and sealing unit	LS		LS	30,000
9	Fuel Wood	LS		LS	60,000
10	General Overheads/Other Charges	LS		LS	50,000
	Total				8,10,750

***Note:** For item no. 9 i.e., Fuel Wood, 100 per cent of the cost will be borne by the concerned beneficiaries. However, for rest of the items, the beneficiary share (either 25% or 50%) will be as per the project guidelines.

Financial Returns: Total expected average herb yield/ha is 200 q which in turn, would produce 50 L of *Tagetes* oil. The average market price @ Rs 10,000/L may give a return of Rs 15,00,000/- per 3 years (for 1 ha).

Cost Benefit Analysis: The Benefit : Cost = $15,00,000/8,10,750 = 1.85$. Any project which on PNV gives a value of 1.85 times that of investment is sustainable. However, this benefit will be spread over a period of 3 years.

Sustainability: The sustainability of this activity will depend on motivation of people after the project period. If the practice of cultivation coupled with proper care of this species is adopted on their cultivable land and/or village common lands, they are bound to get rich dividends out of it.
