

## Marigold Cultivation - a Sustainable Avenue for Farmer's Livelihood Security

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### Introduction

Marigold is one of the most commonly grown flowers for garden decoration and is extensively used as loose flowers for making garlands for religious and social functions. It has gained popularity amongst gardeners on account of its easy culture and wide adaptability. Its habit of free flowering, short duration to produce marketable flowers, a wide spectrum of attractive colours, shape, size and good keeping quality has attracted the attention of flower growers. Marigolds are ideal for cut flowers, especially for making garlands. They can be planted in the beds for mass display or grown in pots. The French Marigolds are suitable for hanging baskets and edging. The demand for Marigold flowers during Dashara and Diwali is very high.

### Climate:

1. Marigold requires a mild climate for luxuriant growth and flowering.
2. The optimum temperature range for its profuse growth is 18-20°C.
3. Temperatures above 35°C restrict the growth of the plants, which leads to reduction in flower size and number.
4. In severe winter, plants and flowers are damaged by frost.

### Soil:

1. Marigold can be grown in a wide range of soils, as it is adapted to different soil types.
2. French (Dwarf) marigolds are best cultivated in light soil whereas rich well-drained, moist soils are best suited for African (Tall) marigolds.
3. Sandy loam soil with pH 5.6 to 6.5 is ideal for its cultivation.

### Species and cultivar

Among 50 species of marigold only for are cultivated. These are

1. **Tagetes erecta** (African marigold): cultivating it for medicinal, ceremonial and decorative purposes. This plant reaches heights of between 50–100 cm (20–39 in). The colour range is from white and cream to primrose, yellow, gold and orange.
2. **Tagetes patula** (French marigold): The flower is annual, occasionally reaching 0.5 m by 0.3 m stem is reddish and the foliage is darker than African marigold. The colour of the flower varies from yellow to red, either single or double and borne on a proportionately long peduncle.

#### **Varieties of African Marigold:**

1. **Pusa Narangi Gaiinda:** The plant of this variety is of medium stature, grows at a height of 80-85 cm. the plant remains vegetative for 100 days and flowers in 125-135 days. The flowering duration ranges from 45-60 days. The colour of the flower is orange with big ruffled florets. The yield of variety is 25-30 tonnes/ ha. This is an open-pollinated variety and seed can be multiplied in the farmer's field.
2. **Pusa Basanti Gaiinda:** The plant of this variety are medium stature, which grows a height of 60-65 cm. the plant remain vegetative for 135 days and takes 140-145 days to flower. The plant needs to pinch 45-50 days. The variety was sown in October and transplanted during November. It is an open-pollinated variety and yields up to 75-100 kg of seeds/ha.
3. **Pusa Arpita:** It is summer growing marigold. The plant has dense foliage. It is also an open-pollinated variety.
4. **Serakal:** this variety was identified in Eastern India. The speciality of this variety is uniform and bushy growth of the foliage and uniform size of flowers as well. The plant is generally grown by cutting. This plant can be propagated throughout the year.

#### **Land preparation:**

For the main field, the land should be ploughed well followed by 2-3 harrowing and mixing of FYM @ 20-25 t/ha should be incorporated into the soil. Make the ridges and furrow properly.

#### **Propagation:**

1. There are two common methods of propagation of marigold i.e. by seeds and by cuttings.

2. Plants raised from seeds are tall, vigorous and heavy yielders and hence, seed propagation is preferred to cuttings.



### **Marigold seed**

#### **Nursery raising:**

1. The marigold seeds are black and remain viable for about 1-2 years for rising of seedlings
2. Seed germinates in 5-7 days. Before sowing the seeds should be treated with captan 2g/kg of seed to prevent damping off.
3. Seeds should be sowed in pots, seed boxes or raised nursery beds.
4. Nursery beds are prepared by digging areas and incorporating well rotten FYM.
5. Before sowing the seeds, the soils should be drenched with Captan to avoid the ants, which carry away the seeds.
6. Seeds should be sown thinly (6-8 cm row to row) and 2cm deep and covered with sieved leaf mold.
7. The nursery beds should remain moist during the entire period.
8. The quantity of seed required depends upon the level of its purity and germination rate.
9. Generally, 200-300g seed/acre is required for raising the nursery in the summer and rainy season, and 150-200g/acre for the winter season.
10. About 1.0-1.5 kg seeds are required for planting in one hectare whereas 250 g/ha is sufficient in the case of F1 hybrid. Seed germinates in 5-7 days.
11. The seed germination is 4-5 days after sowing and seedlings become ready for transplanting after 3-4 weeks for sowing.

**Marigold nursery prepare in open field****Marigold nursery in Pro-tray in****Sowing time and season:**

Depending on the environment, planting of marigold can be done in three seasons i.e. rainy, winter and summer and seeds are sown accordingly. Hence, flowers of marigolds can be obtained throughout the year. The seasons of sowing and transplanting of seedlings for obtaining flowers at different seasons of a year are as under:-

| Flowering seasons | Sowing time   | Transplanting time |
|-------------------|---------------|--------------------|
| Late rains        | Mid-June      | Mid-July           |
| Winter            | Mid-September | Mid-October        |
| Summer            | Jan-February  | February- March    |

**Transplanting of seedlings:**

1. Marigold seedlings are easily transplanted and established in the field without much mortality.
2. At the time of transplanting, they should be stocky and bear 3-5 true leaves.
3. Thin and long seedlings do not make a good plant.
4. Very old seedlings are also not desirable.
5. Transplanting should be done in well-prepared land and soil is pressed around the root zone to avoid air pockets.
6. After transplanting, light irrigation or watering with rose cane should be done.
7. Plant density depends largely upon the growth habit, cultivar and soil type.
8. In general, spacing should be 30 cm x 30 cm for French marigolds and 40 cm x 40 cm for African marigolds.

9. Proper spacing between plants is required for better development of plants and higher flower yield.

#### **Manure and fertilizers**

1. Well decomposed FYM @ 24 t/ha should be mixed before ploughing.
2. In addition recommended N : P : K fertilizer dose would be 100:75:75.
3. Half quantity of nitrogen should be and full of potash and phosphorus should be applied as basal dose, preferably one week after transplanting.
4. The remaining quantity of nitrogen should be 30-40 days after transplanting.
5. Marigold also requires zinc and boron for flower quality and yield.

#### **Weeding**

1. Weeds are a major problem in marigolds, especially in rainy season crops. If the weeds are not removed in time, a great loss would occur in terms of the growth and productivity of marigolds.
2. During the entire growth 3-4 manual weeding are required.
3. Weeding should be done as and when necessary.

#### **Irrigation**

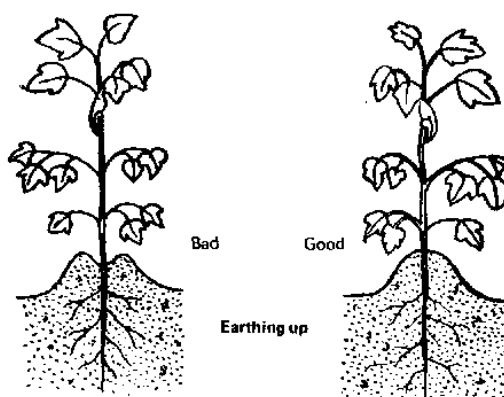
1. Irrigation is done once a week or as and when necessary.
2. Water stagnation should be avoided.
3. Irrigate the crop in 7-8 days intervals, but the frequency and quantity of water also depend upon soil and season. In lighter soil, more frequent irrigation is required than that in heavy soil.
4. In hot summer it requires irrigation after 405 days interval while at 10-12 days interval in winter months.
5. Rainy season crops are irrigated according to the climate.
6. Constant moisture supply be maintained from bud formation to harvesting of flowers.

#### **Pinching/ nipping and earthling up:**

1. Three weeks after transplanting earthling up is done and then one week after earthling up or 1 month after transplanting the seedlings.
2. Pinching is followed for bushy growth of the plant and development of lateral branches.



3. Pinching is generally done for the 40 days after transplanting, late pinching at 50-60 days proved less effective for branching.
4. Pinching results into production of more number of flowers.



Pinching up in Marigold





Earthing up in Marigold

**Diseases management:**

| Diseases   | Symptoms   | Managements   |
|--|--|---|
| Damping<br>( <i>Rhizoctoniasolani</i> )  | off<br>Brown necrotic spots on young seedlings                               | <ul style="list-style-type: none"> <li>• Proper drainage and ventilation, avoid overwatering</li> <li>• Drenching with copper oxychloride @3g/l</li> </ul>                            |
| Collar rot ( <i>Pythium sp.</i> ,<br><i>Phytophthora sp.</i> and<br><i>Sclerotium rolfsii</i> .) | Black lesions on the main stem. Rotting at the collar region.                | <ul style="list-style-type: none"> <li>• Crop rotation for 3-4 years. Carbendazim @ 1g/l reduces the incidence of disease.</li> </ul>   |
| Alternaria leaf spot ( <i>Alternaria tagetica</i> , <i>A. zinnia</i> and <i>A. alternata</i> )   | Minute brown spot near the lower leaves and then progress upward.            | <ul style="list-style-type: none"> <li>• Avoid overhead watering.</li> <li>• Spraying of Dithane M-45 2 0.2% at fortnightly intervals from the first appearance of disease</li> </ul> |
| Botrytis flower Blight ( <i>Botrytis cinerea</i> )   | Ashy grey spot on bud scales and stems. Dying of blooms.                     | Sanitization Adequate spacing<br>Spraying of mancozeb at 0.2%   |
| Fusarium Wilt ( <i>Fusarium oxysporum</i> )  | Pale green leaves, wilting of the plant.                                     | Crop rotation Carbendazim (0.2%) is effective   |
| Powdery mildew ( <i>Oidium sp.</i> And <i>Leveillulataurica</i> )                                | It appears as grey or white powder. Leaves turn yellow and fall prematurely. | Kerathane (40 E.C) @ 0.5% or dusting sulphar powder at 15 days interval.  |

|  |                                 |                      |
|--|---------------------------------|----------------------|
| Viral disease ( <i>cucumber mosaic</i> ) | Streaking or mottling of leaves | Dimethoate at 2 ml/l |
|--|---------------------------------|----------------------|

**Pest management:**

| Pest  | Symptoms  | Managements                                   |
|---|---|---|
| <b>Red spider mite (<i>Tetranychus sp.</i>)</b><br>      | They suck the plant sap,                        | Spraying of Kelthane (2 ml/l)                 |
| <b>Hairy caterpillar (<i>Diacrisia oblique</i>)</b><br> | Eat away the foliage.                           | Spray Carbaryl @ 2 ml/l                       |
| <b>Aphid</b><br>                                       | Black or brown spot                             | Spraying of malathion or dimethoate at 2 ml/l |
| <b>Leaf Hopper (<i>Empoasca fabae</i>)</b><br>         | Cupped leaves, rolled leaves wilting of leaves. | Spraying of Dimethoate at 2 ml/l              |

**Harvesting of Flowers:**

1. After transplanting plans take 40-50 days to flower.
2. Loose flowers are plucked when attaining full size depending upon the variety.
3. Flowers should be harvested in the morning hours.
4. Irrigation before plucking gives better flower quality.
5. Plucking of flowers regularly and removal of dried flowers enhance the yield.
6. French Mangold starts flowering 1 to 1 Vz months after transplanting while African Marigold 14 to 2 months after transplanting of seedlings.

7. For Garland stalkless fully opened flowers (loose flowers) are picked, white for vase decoration also fully opened flowers with stalk are plucked.
8. Loose flowers are packed in a bamboo basket, while flowers with stalks are bunched in bundles and transported to market.
9. From one plant near about 100 to 150 flowers are obtained. The blooming duration is near about 3 months.

#### **Packing:**

1. After harvesting, it is better to keep flowers in a cool place.
2. The marigold is packed in gunny bags for the local market and distance market bamboo baskets are used.

#### **Transportation**

Different means of transportation viz. Rickshaws, Buses, Trains are used to carry the flowers to market depending upon the distance.

#### **Yield**

On average a fresh flower yield of - 200-225 q per ha during the rainy season

- 150 to 175 q per ha in winter
- 100-120 q/ha in summer can be obtained.