

MARIGOLDS



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INDEX

1. Marigold: An Introduction	1
2. Taxonomy of Marigold	1
3. Classification of Marigold	2
4. Uses of Marigolds	2
5. Cultivation Practices for Marigolds	3
6. Planting the Crop	4
7. Pinching in Marigold	5
8. Post Harvest Management	6
9. Marketing of Marigold	6
10. Weed Management	7
11. Insect Management	7
12. Disease Management	9
13. Common Practices for Pest Management	9

Marigolds: An Introduction

Marigold is one of all the important commercial and household flowers which are very popular amongst gardeners and florist for easy cultivation and revenue generation. No house garden is left without marigold and it has also gained importance in view of easy commercial cultivation. It produces many flowers in a single plant in short duration and in very attractive colors, sizes and shapes. The market value of this crop is very high and is considered as an easy way for quick remuneration. Due to its several attractive colors and diverse uses, it has become one of the mostly accepted commercial flowers amongst small and large florists. The price of this flower in the market varies according to demand and supply of the produce. The flower shapes resemble as that of daisy, carnation or coreopsis.

Botany and Taxonomical Classification of Marigolds

Marigold comes under genus *Tagetes* and family *Compositae*. The plant is both annual and perennial in nature. The leaves are pinnate and dark green in color, flowers color ranges from yellow to orange having maroon variegation having flat to round heads. The flower has multiple florets per head. The cultivated varieties are mostly Mexican (*or Tagetes cempasuchil*), African (*or Tagetes erecta*) and French Marigold (*Tagetes patula*). There is one more species *Tagetes minuta* which is cultivated commercially to extract oil and is used as botanical insecticides. Most of the species of Marigold are found to be the native of North and South America.



Classification of Marigolds

Marigolds are mainly divided into two categories viz. African marigold and French marigold:

African marigold: It is characterized by tall height and large flowers. The height may reach up to one meter and the size of the flower can measure up to 15 cm under full grown conditions. The color of this class also ranges from orange to yellow to whitish.

French marigold: French marigolds have comparatively short heights which reach up to 35 to 40 cm and smaller flowers. Due to dwarf and bushy growth, the same is also used as hedge in many gardens. The flowers color ranges from deep scarlet, deep yellow or orange, rusty red and sometimes combination of these.

Major Varieties of Marigolds

African marigold: Cracker Jack, Dubloon, Giant Double African Yellow, Crown of Gold, Golden Age, Fiesta, Golden Yellow, Mammoth Mum, Happiness and Spun Gold are some of the major varieties of African marigold.

French marigold: Valencia, Rusty Red, Butter Scotch, French Brocade, Harmony, Lemon Drop, Mars, Moonlight etc.

Uses of Marigolds

Religious and Social Uses: The marigold flowers are extensively used in India on special worships and social gatherings like marriages. Due to large number of flowers in small time and reasonable prices, the flower has gained huge importance in small floral companies.

Sale of Flower in the Market: The flowers are sold under “loose flowers” category and also in forms of garlands which fetch a good market price.

The Plant as a Shrub: The French marigold due to its dwarf height and bushy growth is also used as shrubs in many gardens.

Marigold as a Trap Crop: The plant is also used as trap crop and planted outside the main crop area in order to trap insects and save the main crop. The insects as a result attract towards marigold and lay its eggs on this plant. For example bordering the tomato or cotton crop with marigold

Culinary Uses of Marigold: The marigold petals are used in many dishes like soups, stews, cakes etc to add flavor.

Medicinal Uses of Marigold: The plant is considered as a very effective herb for medicinal purposes if used as an antiseptic for many skin problems like inflammation, mastitis and eczema. The herb is also used in treatment of stomach disorders such as indigestion, ulcers, cramps, and diarrhea.

Insecticidal Uses of Marigold: The extract is also used as a botanical insecticide to get rid of various insects like household mosquitoes, plant bugs, aphids, leafhopper and nematodes. Marigold is an insect repellent crop.

Cultivation Practices for Marigolds

Climatic Requirements

Sunlight: The plant produces good vegetative growth during long summer days and high temperature and more flowers are emerged from the plant if the condition is opposite.

Temperature and Humidity: The flower for its successful cultivation needs mild climate. High temperature does not suit the crop. The severe winter also affects the quality of crop.

Rainfall: As the crop is easy to cultivate and requires less management practices, the crop can be sown throughout the year viz. summer, winters or rainy in other terms the crops is cultivated throughout the year.

Site requirement: The site for growing marigold is as same as chrysanthemums. There should be proper sunlight as the flowering gets delayed under shade.

Soil Condition: The crop grows very well under normal soil having pH ranging from 7-7.5. In addition fertile and well drained soil having good water holding capacity adds value to the crop growth. Before planting the crop, deep ploughing is required with the addition of well decomposed farm yard manure. The crop grows well when beds of convenient sizes are prepared.



Benefits of Preparing Beds

It is advised to plant the crop in separate beds of convenient sizes as:

Distance between plants and rows will be equal and there will be no competition amongst plants. Thus the crop raised will have equal height and similar sized flowers. Intercultural operations like weeding, hoeing are easy

Planting the Crop

Method of Planting: Mostly the crop is raised by seeds and cuttings however seed cultivation preferred over vegetative propagation as the crop is tall and vigorous and produce large number of blooms as well. A seed rate of 1.5 kg is considered suitable for raising one hectare of crop. The seeds are first raised in nursery beds of size 3 X 1 m. The nursery soil mixture should contain rotten farm yard manure and dusting of suitable chemical like DDT is needed to remove ants which take away the seeds. For raising nursery for one hectare crop, about 8 to 10 beds are required. The seeds after broadcasting over beds are then covered with sand and then watered using a rose can. To raise healthy seedlings, thinning operation is done where healthy plantings are selected weak and dead ones are removed. The nursery beds should be kept moist till the plants are ready to get transplanted.

Planting Time: The crop can be sown in any of the season viz. rainy, winter or summers. The seedlings are ready to be transplanted after 30 to 45 days of seed sowing.

Spacing: The spacing of 20 cm between the plants as well as rows is considered best to obtain flowers with high yield and quality.

Transplantation: The seedlings are ready to be transplanted when three to four leaves appear or in other words when the seedlings are one to one and half months old. The seedlings selected should be healthy and must have three to four true leaves. The seedlings should not be thin, weak and very old to affect the crop in terms of quality and yield. It is advised to perform this operation in evening to avoid transplantation shock, water loss and better establishment of seedlings. After transplanting of seedlings in the beds, the soil should be pressed well and lightly irrigated.

Manuring and Fertilizers Schedule: Well rotten farm yard manure at the time of field preparation is applied to the beds as soil mixture. Optimum quantity of Nitrogen, Potash and Phosphate fertilizers are added to crop for better yield and quality. It is generally considered to have per hectare N, P and K ratio as 2:1:1 whereas equal quantity of N, P and K are added in the field at the time of field preparation and remaining N after transplantation is done.

Irrigation Schedule: It is generally suitable for the crop to have sufficient amount of moisture in the soil as the lack of moisture at any stage of plant growth affects the growth and development and subsequently yield of the crop. The amount of water to be applied also depends on climatic conditions of the site. Proper irrigation is mostly required during vegetative of the plant. In rainy season, it is advised to avoid irrigating the crop as the soil receives sufficient moisture but it is necessary to irrigate the crop at an interval of 4 to 5 days during summers.

Pinching in Marigolds

Similar to chrysanthemums, this operation is also essential in marigold plants for the growth of side branches and thus more flowers as the apical bud is removed from the tip of the plant. Early removal of apical bud results in more branches and flowers and thus high yield of crop while late pinching results in dwarf height and fewer flowers. Hence it is generally recommended to remove the bud after 40 days after transplanting.

Crop Harvesting

The flowers are plucked after attaining full size. However it also depends upon variety of flowers. This operation is generally performed in cool hours mostly in morning to avoid water loss. It is advised to water the field before harvesting the flowers so as to retain enough moisture and better shelf life.



Post Harvest Management

The flowers after harvesting should be kept in moist gunny bags. Mostly these flowers are used for making garlands hence the flowers once harvested should be sent immediately after keeping in the gunny bags to carry to markets. It is recommended to use baskets if flowers are to be carried to long distances to retain the texture. For transportation, it depends on the distance to be covered hence various modes viz. trains, buses or even rickshaws are used to carry the produce.

Yield of Crop

The yield of crop depends on season of planting apart from care of crop. For example during rainy season, the yield of flowers goes as high as 250 Q per hectare while in other season the yield can be dropped to 150 Q per hectare.

Marketing of Crop

The flowers are generally marketed locally because of its uses. Yet the byproducts as well as dried petals can also be sold to far distance markets. The flowers in the form of garlands and loose fetch a good amount of cash as compared to its input costs which is generally low.

Crop Management

Once planted, it is very important to protect the crop from pests as the infestation causes serious damage to the plant and later on destroy the entire crop.



Weed Management

As the plants are herb, attack of weed is very common that leads to competition between plants in terms of nutrients, space, water, light and other requisites for crop growth. Weeds are fast growing plants. They directly compete with main crop and spread very fast thereby leads to crop damage and yield loss.

Common Practices to Avoid Weed Infestation: Proper intercultural operations at regular intervals are always beneficial. All the plants other than main are to be removed as soon as they appear. Hand or Hoe weeding is done as the distance between plants is not much to use mechanical method of weed removal. The space between plants after removal of weeds is covered with proper mulches. These unwanted plants are then thrown away far from the main crop to avoid further attack. Or these are heaped, dried and burnt completely. Under greenhouse conditions, treatment of the soil by trifluralin or EPTC on the same day or day after transplanting the rooted cuttings.

Insect Management

There are various plant saps sucking as well as biting insects which attack chrysanthemum and marigold crops and severe infestation leads to entire crop damage.

The important insects which attack the plant at various growth stages are:

Aphids: The nymphs and adults appear at the time of flowering and suck the cell sap from leaves, stem, stalk, flowers and flower buds. The result leads to discoloration and drying of flowers, stunted growth and leaf curling. These insects are black in color and easily identified in the plant. Aphids are controlled by applying Thimmet in soil or spraying Metasystox 25 EC at the rate of 250 ml in 250 L of water. Neem based formulation can also be applied.

Gram Caterpillar: These insects attack the flowers and young buds and eat them. These insects are either green, or black or yellow colored. The young caterpillars are yellowish white or green in color; the adult is light brown and medium sized. The males are identified by green colored forewings and females by brown colored forewings. The symptoms are identified by very fine holes on the plant. The insect is controlled by field sanitation, collection and removal of damaged buds and flowers. At various points, pheromone traps are set up to attract male insects in order to stop further multiplication. It is recommended to place the traps at the rate of fifteen traps per hectare.

Red Hairy Caterpillar: The larval stage of the crop damages the crop. It eats the foliage completely and leaves the veins. Ultimately the remaining part fall down and entire plant is damaged. Later on the larvae leaves the damaged plant and moves to another. This insect can be controlled by removing all the dead and damaged plants. The chemical method of control includes spraying Thiodon at the rate of 0.0025 per Litre of water.

Cineraria Leaf-minor: This is a common insect of all flowering herbs. The larval stage causes damage by making holes inside the leaf and stems which is identified by thin tunnels inside the affected portion. These tunnels start from silver colored lining and later on broadens when larvae becomes bigger. The larvae feed on the plant as a result the plant wilts or die completely. The best control measure is removal of infected plants and regular weeding. Use of chemical is also advised as is recommended.

European Earwig: The adults are found in leaf litters, debris, piles of rock and loose bark. They feed on flowers and buds of the plant by chewing the portion. The caterpillar also feed on the plant which is clearly identified by pellets of faeces left by it.

Western Flower Thrips: Thrips are very common in all the flowering plants. This insect usually feed on the flowers, buds and young leaves of the plant. The infestation is identified by surface scarring prominent after cell sap is sucked by this insect. As a result, the infected portion distorts completely. It is recommended to regularly spray Benzene Hexachloride (BHC) in open gardens and fumigation under greenhouse cultivation.



Disease Management

There are various diseases which can affect the crops leading to damage of entire field area if control measures are not adopted at right time.

Some of the common and easily identified diseases of this crop are:

Leaf Spot: Small brown circular spots on lower portion of the leaf which progressively enlarges and as a result there is severe leaf defoliation and plant death. Spraying the crop with Dithane M fungicide affects the disease spread.

Bud Rot: The appearance of this disease is mainly on young flower buds. The symptoms are dry rotting of buds and discoloration of sepals and stalks. Severe browning of florets and later on the bud turn deep brown and dries up completely. This causes failure of buds to open. Chemical control measure is similar to Leaf Spot.

Powdery Mildew: There is small whitish growth on leaves resulting to spread of white powder on all aerial parts of plant. As a result, the quality of plant is reduced and growth ceases leading to plant death. The disease can be effectively controlled by spraying Sulphur fungicides on fortnightly intervals or as recommended.

Common Practices for Pest Management

Some of the common practices to be followed while planting this crop can be:

- Remove dried, dead and damaged plants from the main crop area.
- Regular weeding and intercultural operations is done
- Application of mulches after removing weeds
- Overwatering and water logging is to be avoided
- Application of completely decomposed farm yard manure to avoid invitation of diseases

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