

CHRYSANTHEMUM FLOWERS



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Chrysanthemums : An Introduction

Chrysanthemum is also known as “Queen of the East”. The word is composed of two Latin words viz. “Chrysos” means gold and “Anthemion” means flower. It is also known as ‘Glory of the East’. It is one of the most exciting and widely cultivated flowers that can be grown in gardens as well as in commercial flower farms. The plant produces profuse and showy flowers with a wide variety of color, shape, and sizes. Chrysanthemum has emerged as the most domesticated plants where it is highly regarded and priced by the people all over the world. It is generally grown as a potted plant, cut flower, loose flower and as an edge plant around the trees.

Botanical and Taxonomical Description of Chrysanthemum

Chrysanthemum belongs to the genus Chrysanthemum with various species and family Asteraceae. It is represented as Chrysanthemum indicum L. The species are either annual or perennial in nature, the plant height ranges from 50 to 150 cm. The leaves have alternate bearing and inflorescence heads are many flowered. There are around 160 species of chrysanthemum discovered so far amongst them 30 species are cultivated. The flower is a short day plant hence it flowers in autumn and winters under natural conditions whereas it requires long days for its vegetative growth. The Chrysanthemum flower is composed of two kinds of florets: -The floret which is at the centre or Disc Floret and the floret which forms a periphery or Ray floret. Disc florets are perfect flowers having both male and female reproductive parts, situated in centre of the flower having five united petals. Ray florets contain only female reproductive parts hence they are imperfect flowers. Each of the floret is able to produce seed.

History and Centre of Origin of Chrysanthemum

Most of the cultivated species of Chrysanthemum have China as their Centre of Origin as it was first cultivated in China although generally these flowers are considered to be the native of China, Japan, North Africa and Southern Europe.

Classification of Chrysanthemum Flower

The classification is done on the basis of structure and shape of blooms, number of florets, arrangement and shape. The flowers are mainly classified into Large and Small. The Large and Small flowers then further classified into 13 and 10 groups respectively.: Group 1: Large Flowers and Group 2: Small Flowers.

GROUP 1: Large Flowers of Chrysanthemum

Irregular Incurved: Just opposite to the above pattern, the florets are broad, smooth in appearance, curved inwardly in an irregular pattern. The size of bloom is large and varies from 15 to 20 cm. Here, the disc florets are entirely covered by upper florets.

Reflex: The florets have downward curving. The bloom top is flat when open. These are not as large as Irregular Incurve but have a size range of about 10 to 15 cm.

Regular Incurved: Here, the florets are curved inwardly in a regular pattern, narrow, smooth and thus form a perfect ball in appearance. The size of bloom varies on an average of 15 to 20 cm thus there is no visibility of disc.

Decorative: The flower is more flat as compared to other top three classes. The upper florets are incurves and the lower ones are reflexed. These florets are shorter in length.

Intermediate Incurve: The flowers under this category have short and incurved florets with open look. It is the intermediate between Irregular Incurve and Regular Incurve.

Pompon: There is a small and globe like bloom which becomes round with increase in flower opening days. The florets can either be incurved or reflexed which are regularly shaped. The size of flower is not more than 10 cm.

Single and Semi-Doubles: There are several rows of ray florets with one disc florets in the flowers belonging to this category. It is very common in most of the members of family Asteraceae.

Anemone: The difference is the raised centre of this flower rest it is similar to Semi-Double chrysanthemums.

Spoon: The ray florets are long and tubular in shape and resemble that of spoon. The flower looks similar to Semi-Doubled where the disc floret in round and clearly visible but the ray florets are like spoons.

Quill: The ray florets are tubular to straight have open tips but no open center.

Spider: The ray florets are long and tubular, either fine or course which coils at the end. The tips of these florets may be open, loose and look like fireworks displays.

Brush and Thistle: The florets are tubular which grow in an upright fashion in a brush type of chrysanthemum while the florets twist around the stem in a horizontal manner in thistle form.

Unusual: Under this category, those chrysanthemums are place which do not fit under any of the above category.

GROUP 2: Small Flowers

Korean: The ray florets of the flowers are flat under this category of flowers. The total numbers of whorls are less than five.

Korean Double: In contrast to Korean Single, the number of



whorls in this category of flowers is more than five including the open disc.

Decorative: Here, the centre of the bloom is invisible and flower is completely double. This category is similar to Korean Double.

Anemone: The disc florets under this category are developed fully while the ray florets may be either twisted or flat or quilled.

Pompon: The ray florets being incurved or reflexed, gives a compact hemispherical shaped bloom by regular arrangement of florets. These florets are short and broad in appearance. The disc florets appear to be covered or open to a small extent.

Button: The blooms under this category of flowers are compact, hemi-spherical and small.

Quilled: Under this category, the florets appear tubular

Spoon: The flowers of this category show the color of inner petals because the ends are open to tubes.

Semi- Quilled: The florets open at the ends which are tubular in the beginning. The open portion of the same appears flat, reflexed or incurved while there is open disc in the flower.

Stellate: Here the sides of the ray florets are reflexed either twisted or not and are regular in appearance.

Major Varieties of Chrysanthemum Large Flowers

| S.No | Category | Important Varieties |
|------|---|--|
| 1 | Incurved | Snow Ball, Sonar Bangla, Graoe Bowl, Ghenghiz Khan |
| 2 | Incurving | |
| 3 | Reflex | Cresta, Beatrice May, City Beauty, Day Dream, Sweet Heart, Regelia, Dorothan |
| 4 | Intermediate | Reid, Mrs. W.A., General Petain, Sun Flight |
| 5 | Quilled | Green Sensation |
| 6 | Ball | Red Jack, Nigeria, Pride of Madford |
| 7 | Spider | Coronation, Mahatma Gandhi, Rupasi Bangla |
| 8 | Miscellaneous Categories: Spoon, Anemone and Single | |

Major Varieties of Chrysanthemum Small Flowers

| S.No | Category | Important Varieties |
|------|---------------|--|
| 1 | Korean Single | Cardinal, Chairman |
| 2 | Korean Double | Flirt, Jante Wells |
| 3 | Decorative | Blue Chip, Flame Blair, Yellow Divinity, Hurricane |
| 4 | Anemone | Cloud Bank, Golden Sands, White Sands, Tan vedova, Vedova, Caleb Cox |
| 5 | Pompon | Dandy, Cotton Ball, Birbal Sahni, Otome Zakura, Fred Yule, Beeswing |
| 6 | Button | Gold Dust, Kingfisher |
| 7 | Quilled | Snow Crystal, Yellow Hectar, Crystal Yellow |
| 8 | Spoon | Modipon, Anokha |
| 9 | Semi-Quilled | |
| 10 | Stellate | Laura, Stella, Red Star |

Uses of Chrysanthemum

Chrysanthemum for Flowering Purpose: Chrysanthemum flowers can be grown in pots, as loose flowers and as cut flowers also. But it is highly cultivated as pot and bedding purposes. The flowers look very effective when grown in shrubbery, mounds, and as borders in the gardens. As a cut flower, it has longevity of about 7 to 10 days in vases.

Chrysanthemum for Culinary Purpose: Chrysanthemum Tea is a beverage where white flowers are boiled and tea is prepared. As a Chinese cuisine, the leaves are boiled and used as greens. The flower petals are also mixed with some of the soups to enhance aroma.

Chrysanthemum for Insecticidal Purposes: Chrysanthemum cinerariaefolium, commonly known as Pyrethrum has insecticidal properties and is also economically important. The active component of this species is Pyrethrin, which is extracted from seeds and sold in the market as botanical insecticides. This insecticide is used as a suspension or oil or in powdered form and used against insects, mosquitoes, but are harmful to fish.

The Flower as a Symbol: Chrysanthemum flower has different meanings in various countries. In USA, the flower symbolizes positivity and cheerfulness while in Japan and Korea, the same is presented in the form of expressing grief. In European countries, only the incurved flowers are used on funerals or graves.

Indoor Gardening by Chrysanthemum: There are two types of chrysanthemum: Garden and Floral. The floral chrysanthemum is useful for indoor planting to brighten the wall.

Environmental Uses of the plant: The plant is also used to control indoor pollution.

Pyrethrum: Pyrethrum is common name for Chrysanthemum cinerariaefolium, which has insecticidal properties and is also sold in the market under the same name as an oleoresin. The insecticide, as a broad spectrum insecticide is used against all types of insects including beneficial ones as well as mosquitoes in various forms viz. suspension in oil or water, or in powdered form. The active ingredient Pyrethrin, attacks the nervous system of insects, and inhibits their further growth. The compound does not persist in the environment for long as it degrades during heat and Ultraviolet light. It comes under botanical insecticides.

Cultivation Practices for Chrysanthemums

Climatic Requirements

Sunlight: The crop has to receive plenty of sunlight as the crop needs long day hours for proper vegetative growth and short day hours for flowering. Below is the table explaining minimum amount of light requirements by the crop during each phase of its growth.

| Phase | Up to the time | Photoperiod |
|------------------|--|--------------------------------------|
| Vegetative Phase | Till the plant attains 50-60 cm height | 13 hours day light and 11 hours dark |
| Flowering Phase | Till harvest | 10 hours day light and 14 hours dark |

Temperature: The suitable temperature to grow the best quality of chrysanthemums is 20 to 28 degree Celsius during day and 15 to 20 degree Celsius during night.

Humidity: Humidity range of 70 to 90 percent is considered satisfactory for normal plant growth.

Rainfall: Rainfall is also an essential requisite for chrysanthemum provided the soil should have good water holding capacity and proper drainage to remove excess water from the field. The crop requires plenty of rainfall to overcome water deficiency from the field.

Site Selection: The site should receive plenty of sunlight as the crop is a short day plant and inflorescence occurs during the day only. The air circulation in the site should be good. It is better to avoid a site having partially shaded. It is recommended to change the site after three years.

Common Pre-requisites for Site Selection for Commercial Cultivation: The site should be away from traffic, factories and buildings to avoid pollution. The site should have metallic connectivity. There should be proper transportation carriages to load and unload the materials required. There should be storage and packaging facilities near to site. Proper practices to avoid pest infestation is essential. The site should be fledged with irrigation facilities.

Soil Requirements: The soil should be well drained, rich in organic matter and have good air circulation. It is advised to spread the organic matter over the soil before sowing chrysanthemum seeds or planting propagated parts. The plants are prone to freezing and frost hence it is recommended to dry the soil, the best way to overcome this condition is to select the site which is not shaded even partially and receive plenty and full sunlight. The satisfactory pH of the soil should be around 6.5.

Planting Time: The ideal time of planting the crop is spring when winter frost is over. All the varieties of this crop are suitable to develop a good root system if planted in spring season. But the crop can be raised anytime if the climatic conditions are suitable to develop a strong root system of the crop. If raised under greenhouse conditions, the plants in the pots/polythene should be kept inside the greenhouse till they become hardy enough overcome cold temperature.

Planting Method: The crop can be raised by either of the method viz. planting by seeds or vegetative propagation. The seeds are directly sown in the field once the bed is prepared. After sowing, the bed is to be watered immediately. But mostly seed cultivation is done to raise new cultivars. Hence, for garden and commercial cultivation of chrysanthemum plants is done by vegetative propagation. Propagation is done through root suckers or terminal cuttings. Terminal cutting produce neat and strong plants and is preferred over root suckers.



Terminal Cuttings: Cuttings of 5 to 7 cm length are taken from healthy plants in during middle to end of June. The basal leaves are removed from the cuttings and treated with plant growth hormone (not necessary) for quick root growth and are planted in sand either in pots or beds. These cuttings are then kept under shade nets as partial shade is essential for better root growth. The seed beds or pots are watered 4 to 5 times daily. Along with water, it is advised to mix any fungicide to avoid rotting of cuttings. The roots are supposed to appear after 2 to 3 weeks from cuttings which are ready for transplanting.

Planting Space: The ideal distance of planting the cuttings in the bed is 20 cm between the row and 15 cm between the plants

Planting Mixture: The crop grows at its best in a nutrient rich well drained soil where there is no problem of water logging. For root development from cuttings, there should be soil and for transplanting the rooted cuttings into the beds the beds should be first covered with nutrients or plant food and then planted in the beds .

Planting Mixture for Growing Chrysanthemum in Pots: Chrysanthemum, as a garden crop is grown in pots to place them near to houses in verandas, windows gardens and in the lawns too. For growing the flower in pots, different types of earthen pots are taken and the mixture commonly composed of garden soil, sand, leaf mould and well rotten farm yard manure in the ratio of 3:1:1:1. Before filling the pot with this mixture, some small stones are placed in the bottom of the pot and then the same is filled with the said mixture. The cuttings are then planted in the small pots first generally in mid to July end. Watering is done depending on the requirements by the plant.



When the cuttings attain a desirable height, the same plant is repotted in a bigger pot. Normally repotting is needed after 30-45 days of planting the cutting in small pots. Small doses of nutrients are also applied to feed the plants.

Planting Mixture for Growing Chrysanthemum in Fields: This is generally done to grow crop commercially. For this the field is advised to prepare each time the crop is raised. The field is prepared in July end by deep plough the soil two to three times with the addition of farm yard manure along with Single Superphosphate and Muriate of Potash in required quantity. The cuttings are transplanted in the well prepared field usually at recommended distance of 30 cm between rows and 20 cm between plants.

Fertilizer Schedule: The chrysanthemum flowers needs adequate amount of fertilizers for a better yield. Generally for commercial cultivation, the fertilizers are applied at the time of field preparation especially Single Super phosphate and Muriate of Potash at the rate of 100 kg and 133 kg respectively for one acre of field as a basal dose. Similarly, proper amount of Calcium Ammonium Nitrate is also applied as split dose at thirty days interval. Application of Urea for this crop is not recommended as it causes phytotoxicity. Application of dry fertilizers is recommended over other forms. The crop is watered after fertilization. The application of potassium fertilizers increases with the appearance of buds. Foliar application is preferred over other methods because higher percentage of nutrients is absorbed by the plants. This method is also suitable in those areas where soil conditions are not favorable

Irrigation Schedule: Chrysanthemum plants need plenty of water. For pot cultivation of the flower, the plant is watered so that it comes out of the hole of pot but overwatering should always be avoided. After planting also, the plants are thoroughly watered to firm the soil so that roots of the plants start holding the soil. During summers, rain water is sufficient to irrigate the crop but over watering is avoided here also. The soil should have proper drainage to protect the soil from water logging. Other seasons, the plants are watered when soil starts drying. Watering the plants through sprinklers is always better than hand watering. About eight to nine liters of water per square meter is required daily to irrigate the crop. Cover the crop with mulch to retain the moisture.

Pinching: In Pinching, the growth of terminal bud is obstructed to encourage growth of side or lateral branches to spread the area of plant. Pinching is done to increase the number of blooms in one plant. Single pinching is done to have two flowers in one branch while the purpose of double pinching is to have four flowers in a single branch. It is mostly done in case of spray type of chrysanthemums to produce small to medium sized numerous flowers in one plant. This operation is mainly done to have mass effect in the garden or production of chrysanthemum commercially

Disbudding: In disbudding, the side buds arising from axillary branches are removed and only central one is allowed to grow fully. The aim of disbudding is to maintain the quality of flower. It is especially done in case of standard chrysanthemums. Regular disbudding is advised in order to attain a big sized quality plant in pots.

Staking: Staking is also an important cultivation practice to be followed in chrysanthemum in order to provide support to the plant whether the plant is grown in pots or fields. For standard varieties, the number of stakes required depends on number of main branches to be maintained and bloom while in spray types 2-3 stakes are inserted on the border of the pots to provide support to the plant

Mulching: Mulching on the beds is done in order to retain the moisture content of the soil and also preventing fluctuation of moisture. But deep mulching is always avoided as it can cause stem rot. Peat is considered as the excellent mulch under greenhouse conditions

Overwintering: Chrysanthemums are cold hardy winter perennials which survive winters if proper care is taken. Though the foliage dies due to low temperature and frost yet the roots remain viable and show the life when feasible weather appears. To strengthen the plant's ability to survive cold weather, covering the plant with suitable mulch is considered the best option. For this loose mulch materials like straw, pine needles or shredded leaves which are supposed to be removed during spring. Snow cover is also used as mulch material.

Harvesting: Generally the flowers are harvested after three months of planting at intervals of four days. But it also depends upon purpose of harvesting. For long distance transportation, flowers are harvested when one-half of the bud is open otherwise for short distances the maturity index is when the flower buds open up to two third to three fourth. If planted in July, November is the exact month of harvesting the flowers. The same can be extended if planted in next season. Early morning is the best time to harvest the flowers. Other than morning, during the late hours of the day when dew dries up, is also considered as appropriate of harvesting the flowers. For cut flowers, the length of stem should be up to 20 cm from the ground and collected in bucket containing cold water to retain the moisture content of the plant. Mixing any floral preservative add value to the flower by enhancing the shelf life. The post harvest life of the flowers can be extended by dry storing the flowers at 0 to 1 degree Celsius for three weeks.

How to Care for Chrysanthemums?

Though chrysanthemums have naturally longer shelf life yet to increase the life to some more extent, there are some points to be taken care of, after harvesting the cut flowers.

These are:

- The flower should be kept cool all the time
- To avoid rotting of the plant, some of the leaves from bottom half of the stem is to be removed
- There should not be any woody base in the stem. It will help in absorption of water and nutrients more actively if the stem is green
- The stem ends should never be damaged
- To increase the vase life, floral preservatives are advised to be added with water
- It is advised to replace the water from the vase every two to three days

Yield of Chrysanthemum Crop

The yield depends upon type of varieties grown in the field and also on crop management practices. Along with that growing region and plant density also influence the yield of the crop. Average yield of this crop is around 10 to 15 per hectare.

Marketing Chrysanthemum

Chrysanthemum plants have very good keeping quality and standard varieties produce long stems hence these flowers are very much suitable for flower arrangements. Spray chrysanthemums are used for making garlands. It is now the leading cut flower and pot plant that is cultivated commercially and sold in international market. It has huge demand these days due to its marketing potential in terms of multipurpose uses.

Greenhouse Cultivation of Chrysanthemum

There is throughout the year demand of this flower. Though it is not possible to meet the demand by cultivating this flower all round the year in open conditions because of seasonality yet there are other ways where growers can benefit themselves by meeting the demand of chrysanthemum. Cultivating chrysanthemums under greenhouse conditions and providing artificial environment congenial for its growth and quality blooms is considered as another option to produce the crop throughout the year.



Package of Practices to Grow Chrysanthemums Under Greenhouses

Cultivation: Cultivation of chrysanthemum under greenhouse conditions makes it possible to grow the flowers throughout the year. For this, all the parameters essential for flowers production are provided under controlled environmental conditions. The temperature, humidity, aeration etc are modified according to crop needs.

Structure: The structure of the greenhouse should be in such a way so as to provide sufficient light during winters. The covering of this structure should be either polythene or glass and the orientation is advised to be towards east to west. To maintain sufficient temperature and humidity inside the greenhouse, ventilators or exhaust fans are to be installed.

Benches: Benches are constructed to grow cut or potted plants. To grow cut flowers, the benches are elevated to some extent. There should be one central path to transport sprayers, wheel barrows, and narrow walks.

Cooler Region: If greenhouses are constructed in cooler region, then there should be some arrangements for to keep the inside warm mostly during the nights. There should be pipes installed inside the greenhouse to pass hot water or steam. And if greenhouses are in warmer regions there should be fans and pads installed at the time of construction to cool the inside air. For misting, the nozzles are recommended throughout the greenhouse and the water pressure should not be less than 500lb/inch to carry out the process of evaporation without falling on leaves.

Lighting: Lighting system should be proper to ease normal growth of plants. As chrysanthemum is a short day plant in terms of flower initiation, during summer artificial shading arrangements is needed. Here black polythene sheets become a good option. A mixture with proper ratio containing any of the two components from sand, peat, pine bark, humus along with peanut compost makes a good soil mixture. Soil sterilization is very important before planting. It can be done using formaldehyde as recommended. Steam can also be injected and later covered with plastic mulch to prevent heat generation through steam.

Other Operations: Other manual operations like pinching, disbudding, and mulching are also done in the same way as in open seasonal cultivation of this crop. As the plant needs adequate watering, it is advised to install micro-sprinklers system in the greenhouse. Other crop management practices are also followed in the same way as under open conditions.

Cultivation of Medicinal Chrysanthemum (Pyrethrum)

Category: Pyrethrum comes under the category of botanical insecticides extracted from the flowers of *Chrysanthemum cinerariaefolium*, and is used against various plant as well as household insects like mites, ants, aphids, mosquitoes and cockroaches.

Plant: The plant is perennial with multiple stems bearing one flower having white colored petals and yellow disk. The leaves and stems also give strong scent resembling that of medicines. This flower can be planted in home gardens as well as commercially. All the cultivation practices are same as that of other chrysanthemums except that this plant grows best under dry and alkaline soils without much application of fertilizers. Having medicinal properties naturally, this plant is seldom attacked by insect and other pests.

Flower and Harvesting: The mature flowers are harvested usually after five to nine days of opening either in the morning or late afternoon. These are then kept under the sun for removal of water and the dried flowers are then sent to a processing plant where crude pyrethrum can be extracted.

This extract contains 30-35% of pyrethrins which is used as an insecticide and 50% of impurities. Use of this insecticide is in vogue today as it is least toxic to animals, biodegradable and immediately shows its affect by attacking directly to nervous system of the pest.



The flowers are harvested and dried

then crushed to form powder for extraction. A good quality of flower is that which contains at least 1.4 to 1.8% of pyrethrin. Pyrethroids are synthetic version of Pyrethrum.

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.

Chrysanthemum Gall Midge: The adult lays eggs on leaf surface and after hatching its larvae burrows into the leaf tissue. It starts taking food from the leaf leaving small patches on the surface. Later on cone shaped galls develop on those patches. This infestation spreads on other plants or areas if damaged plant is still not removed from the field. The control measures include removal of infested plant immediately, if identified by the grower.

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 scrapping 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:

Powdery Mildew: The disease causes more damage during the end of flowering season although occur during summers. The disease is characterized by grayish colored powdery growth on both sides of the leaves which spread over the stem. This disease is more severe in damp season but also attack the plants during autumn and winter season. Late blooming varieties if brought under greenhouses are to be watched very carefully as the occurrences of this disease is very high. Use of Sulphur based fungicides is recommended to control the crop from this disease.



Black Leaf Spot: It is a very serious disease of chrysanthemum and is characterized by occurrence of grayish brown spots on the leaves. The severe infection turn the entire leaf into yellowish color and plant die due to chlorosis. This disease is effectively controlled by spraying Dithane M-45 at the rate of 0.2%.

Rust: This disease occurs less frequently however the severe infestation causes the big damage. It is characterized by bright orange dust on undersides of the leaves. Rust is controlled by dusting or spraying sulphur

Flower Rot: It is gray mould the symptoms of which are brown water soaked spots on the petals. There are then brown specks on the petals which lead to rotting of complete flower. This disease is controlled by spraying Dithane M-4 at the rate of 0.2%.

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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