04

Field Challenges in Marigold

A. Diseases Problems in Marigold Crop:

During marigold crop cultivation, there are more diseases in Marigold crop and for their prevention it is necessary to diagnose timely, the details of which are presented in the following.

1. Damping Off (*Rhizoctonia solani*):

Brown necrotic spots, girdling the radical which later on extend to plumule and cause pre-emergence mortality. Post-emergence symptom appears as water soaked brown necrotic ring, leading to collapse of seedlings.

Symptoms and Diagnosis:

Damping-off is caused by a number of soil fungi in several genera including: Rhizoctonia, Pythium, Botrytis, Phytophthora, and Fusarium and is often accompanied by low rates of germination. Affected stem tissue on the seedlings may have black water-soaked lesions at the soil line which constrict the stem causing the seedlings to topple. Occasionally, white/pink/gray cottony fungus may appear at the base of the stem.

Description and Life Cycle:

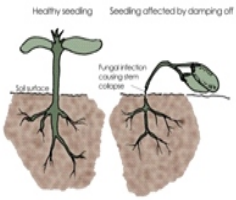
The fungi that cause damping-off are ubiquitous and can multiply and readily infect seedling when conditions favour their development. There is no recommended cure for damping off. Survivors are generally weak and non-productive. However, there are actions which can reduce the likelihood of the condition reoccurring. These include elimination of pathogens and control of environmental conditions.

Management Strategies:

- Sanitation - Dispose of all plants and soil in the affected containers and washing all containers and tools with soapy water and soak/rinse with a 1:10 solution of bleach to water.
- Do not use garden soil or reuse contaminated soil.

- Remove plastic or glass coverings after half of the seeds have germinated.
- Proper drainage should be provided in the nursery beds.
- Soil drenching with brassicol @ 3 gm/l should be followed.

Images related to Disease in Damping off (*Rhizoctonia solani*):



2. Leaf Spots and Blight (*Alternaria, Cercospora*, Septoria):

Botrytis blight, also known as gray mould, is a fungal disease caused by several species in the genus Botrytis. It affects the buds, flowers, leaves, and bulbs of many plants including: African violet, begonia, chrysanthemum, cyclamen, dahlia, geranium, lily, peony, rose, and tulip. The extent and severity depends on weather conditions and cultural practices. This disease is the primary cause of decay in cut flowers.

Symptoms and Diagnosis:

Minute brown circular spots on lower leaves and enlarge at later stage of infection leading to premature defoliation and ultimate death of the plant. Botrytis blight causes buds and flowers to develop abnormally and turn brown. Flowers may have irregular flecks and brown spots; older flowers tend to rot quickly. Soft, brown spots appear on leaves, stem, and flowers following a cool damp period. Affected parts may be covered with a gray mold following damp, cool weather.

Description and Life Cycle:

Botrytis fungi overwinter as sclerotia on dead plant debris in the garden. In the spring, spores form and spread by wind or splashing water to infect dying, wounded, or extremely soft plant tissues. Fungal mycelial strands (web blight) from previously infected plant parts can grow onto healthy plant parts and infect them. The fungus is capable of invading tissue during all periods of the growing season and multiplies rapidly in declining foliage, hence, the need for good sanitation.

Management Strategies:

- Practice good sanitation - Remove and destroy all infected plant parts as soon as they are observed.
- Avoid fertilizing with excessive amounts of nitrogen.
- Avoid overhead watering and avoid overcrowding.
- Depending upon the susceptibility of the plant to this disease, spray every 10 days with a fungicide. Pesticides registered for use include Copper Oxichloride, Chlorothalonil (Daconil) and Thiophanate methyl (Cleary 3336) @ 2 g/l. Fungicides must be applied in advance of the disease as a protestant. Spraying of Dithane M-45 fungicide @ 2 g/l and Sulphur 80 % WP @ 0.2 g/l at fortnightly intervals starting from the first appearance of disease symptoms.
- Proper weeds cleaning.

Images related to Disease in Leaf spots and Blight (*Alternaria, Cercospora*, Septoria):



Powdery Mildew (*Oidium sp.* and *Leveillula taurica*):

Powdery mildew is caused by a fungus and is seen as a light gray or whitish powder on the surface of leaves. It occurs following warm days and cool nights often being seen in the fall and spring. The disease is considered more unsightly than harmful. Death of the plant is rare.

Symptoms and Diagnosis:

Even though each species of powdery mildew attacks only a narrow range of hosts, there are 11,000 species of the powdery mildew fungi, and many ornamentals are hosts. Superficial powdery patches appear on leaf surfaces, young stems, flowers, and even fruit. The powder is composed of mycelium and colourless chains of spores on upright stalks. Later there may be dark “pepper-like” spots among the powder (the spots are spore-producing bodies). As the disease progresses, leaves may be dwarfed, curl, turn yellow, and drop off. Flowers may be deformed. Fruit crops may be reduced, with the fruit misshapen and covered with powdery patches.

Description and Life Cycle:

Powdery mildew commonly winters over as mycelial mats in dormant buds or on plant stems and fallen leaves. During humid and warm

spring weather (with cool nights), infected buds open and spread conidia (spores) to new host tissue. These conidia do not require free moisture in order to germinate as many fungi do. A new generation may be produced every 72 hours, if conditions are right.

Management Strategies:

- Purchase resistant varieties and best strategy for avoiding powdery mildew.
- Prune out diseased tissue and destroy it.
- Keep plants in good vigour and Water early in the day.
- Use fungicides as a preventive treatment before a rain for maximum protection. Spray either sides of leaves and flowers well with Chlorothalonil (Daconil), Cinnamaldehyde (Cinnamite), or copper-containing fungicides 2 g/l. Spraying with Karathane (40% EC) @ 1.5 g/l or dusting with sulphur powder at fortnightly intervals.

Images related to Disease in Powdery Mildew
(*Oidium sp* and *Leveillula taurica*):



4. **Flower Bud Rot** (*Alternaria dianthi*):

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Management Strategies:

- Purchase resistant varieties.
- Space the plants for good air circulation.
- Use fungicides as a preventive treatment before a rain for maximum protection. Spraying of the crop with Fosetyl AI 80 % WP (Aliette) @ 1 g/l or Hexconazole 5 % @ 2 g/l should be followed.
- Spray both sides of leaves and flowers well with Chlorothalonil (Daconil), Cinnamaldehyde (Cinnamite), or copper-containing fungicides @ 1.5 g/l.

Images related to Disease in Flower Bud Rot (*Alternaria dianthi*):



B. Insect-pests Problems in Marigold Crop:

There is an outbreak of many insects in the marigold crop, if not treated in time, the crop gets spoiled to a great extent.

1. Red Spider Mite (*Tetranychus sp.*):

There are many species of spider mite, but one of the most important is the Two-Spotted Spider mite (*Tetranychus urticae*) which attacks a wide range of plants, including beans, eggplant, raspberry, strawberry, fruit trees and more. Some overwinter as adults and some as eggs.

Symptoms and Diagnosis:

These tiny (1/5th of an inch) eight legged creatures resemble minute spiders. From a plants viewpoint they resemble aphids in that they feed by sucking the juice from plants and when present in sufficient numbers they can weaken, stunt or even kill infested plants (or parts of them). The first signs of damage are small light coloured specks on the leaves, and in extreme cases these may become discoloured and scorched and eventually die and fall off.

Description and Life Cycle:

There may also be downy webs (they produce these for protection) on the undersides of the leaves. In warm dry weather (or in a greenhouse) they can multiply rapidly, producing a new generation every couple of weeks. The most important control for spider mites is a healthy population of predatory insects, so do everything you can to encourage them (you can actually buy predatory mites for controlling them). Mites appear on the plants near flowering giving dusty appearance.

Management Strategies:

- Mist spray of water leads to good control of mites.
- For more control use refined oil in your spray.
- For treatment of mites used selective materials *viz.,* petroleum pest horticultural oil and plant based oil.
- Heat water at 20-25 degree C and spray it in mist form at infected area.
- If this fails you might try insecticidal soap, Neem (neem seed oil works the best) or as a last resort, rotenone (but remember that they most often become a problem because indiscriminate use of pesticides kills off natural enemies).
- Spraying Metasystox 25 EC or Mitegate (Fenpyroximate 5 % EC) 1 ml/l or Nuvacron 40 EC @ 1 ml/lit. or Oberon (Spiromesifen 22.9 % SC) 1 ml/l of water.

Images related to Insect-pest in Red Spider Mite (*Tetranychus sp.*):



2. Hairy Caterpillar (*Diacrizai obliqua*):

Polyphagus insect and caterpillar eats away foliage with leaving a papery skeleton which dry up later.

Symptoms and Diagnosis:

Chlorosis, yellowing of the leaves while the veins remain green, is a major symptom of aster yellows. Growth slows down and leaves may be smaller and more narrow than usual. Foliage is sometimes curled. Flowers may be deformed and exhibit bizarre tufts of deformed leaves inside the flower or in place of the flower. Flowers may not produce

seeds. The symptoms of the disease will often differ depending upon what species is infected. For instance, carrot roots may be bitter and hairy while lettuce may show pink or tan spots and have twisted inner leaves.

Description and Life Cycle:

When a leafhopper feeds on a plant infected with aster yellows it becomes "infected" with the phytoplasma and remains infected throughout its life. The phytoplasma cells multiply and cause infection of the insect's salivary glands within one to three weeks. When the infected insects feed on healthy plants, they inject the phytoplasma cells into the plant phloem. Susceptible plants will be symptomatic in 10 to 40 days. The spread of aster yellows is worse in cool, wet summers. Hot dry weather is not favourable for either the phytoplasma or the leaf hopper. As with many disease and pest problems, diagnosis is perhaps the most important factor in controlling aster yellows.

Management Strategies:

- Remove insect infected plants.
- Plant less susceptible plant species.
- May protect susceptible crops by using the mesh fabrics that keep leaf hoppers and other insects away from the plants. Some growers put strips of aluminum foil between rows because bright reflections of sunlight confuse the leaf hoppers.
- Remove weeds in your lawn, garden, and surrounding areas, including plantain and dandelion that may harbour the disease.
- Sprays of Nuvon 50 E.C. or Thiodan 35 E.C. @ 1 ml/l of water.
- Spray of Chlorantraniliprole 18.5% @ 0.3 ml/l of water in the case of severe infestation

Images related to Insect-pest in Hairy Caterpillar (*Diacrizai obliqua*):



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