Pest and Disease Control
in Organic & Bio-dynamic farming

Indiscriminate use of chemical pesticides has resulted in resistance in pests, resurgence of minor pest and high level of residual level in the food materials. High pesticide residues in the food chain cause deaths due malfunctioning of organs, immune suppression, neurotoxicity, impairment of reproductive functions carcinogen city, paralysis, etc and harmful to beneficial flora and fauna.

Moreover in general the farmers hesitate to adopt Organic and Biodynamic farming methods with the fear and lack of information about how to control the pest and disease attack. In reality

"The pest and disease attacks are the true reflection of the fertility status of the soil in which the crop is growing and the quality of the seeds used".

Hence primarily steps have to be taken to increase the soil fertility in long run. With the increase in the soil fertility status of the soil the crop grown will get a balanced nutrition for it growth, so there will be a balanced growth with vigour and resistance power to resist the insect infestation and disease incidences. Then it is very important to get good quality seeds by growing or buying it from a reliable source.

During the early period of farm conversion into Organic and Biodynamic farming practise, while the soil is weak the crops grown will get insect infestation and disease incidences. It is advisable to adopt the physical and biological control measures initially.

In vegetable cultivation:-

Vegetables constitute a major portion in our diet. They play a vital role in human nutrition. They are very essential to provide all essential nutrients for good health. Nowadays due to the introduction of new hybrid varieties in vegetables, which are susceptible to pest and diseases, there is demand for more plant protection, usually with toxic chemicals. Moreover, even post harvest treatment requires Agro Chemicals before it reaches the consumers, to increase the shelf life. As a result of all these practices, we are ultimately consuming high dosages of toxic chemicals, which are causing undiagnosable diseases in us.

Availability of organically grown, good quality vegetables is very low. The best solution for this could be to cultivate it by utilizing all Organic and Biodynamic agricultural principles and methods. Even while cultivating vegetables in the farm or in a Kitchen Garden, pest and disease incidence in it will force people to go for any plant protection measures. Pest and disease occurs mainly due to wrong cultivation practices also. Hence, to avoid pest and disease occurrence, the following agricultural practices should be taken into consideration under "Prevention is better than cure" ideology.

Soil Fertility Improvement Measures

Basically a healthy fertile soil can only give good plant health. Plants growing in poor soil with nutritional deficiency will be very susceptible to pest and disease attacks. Healthy fertile soil will impart power to plants to resist pest and disease attacks. Hence, vitalising and improving the soil by suitable organic and Biodynamic agricultural methods is very vital. For this purpose:

1. Spray the soil with Horn manure (BD500) @ 25 gms/acre and CPP Manure @ 500 gms/acre once in 4 months
2. Apply good BD compost @ 10 t/yr/ac.
3. Apply 2-3 t/yr/ac of Vermi compost,

Quality of the seeds and seedlings

Quality of the seeds has a very significant role in pest and disease incidences in a crop. Hence, it is very important to get good quality seeds and seedlings for sowing and planning respectively. If quality seeds are not available, the quality of available existing seeds can be improved by:

a) Proper selection of mother plant.
b) Repeated sowing and harvesting of seeds on Moon opposite to Saturn days in subsequent seasons.
c) Maintaining the mother plants by organic and Biodynamic farming methods.

Quality seeds can only produce a healthy and vigorous seedling that has an inherent capacity to resist any pest and disease attack and also to give good yield.

While Seed sowing

With the help of the quality seeds, good seedlings can be raised by following the principles mentioned below:

1. Prior to sowing, the seeds should be treated/coated/dressed with CPP manure
2. Select the sowing date based on BD Planting Calendar.
3. Spray BD 501 at 4-5-leaf stage to impart the power of resistance against pest and disease.
4. spray CPP manure as foliar 5 days prior to uprooting,

While transplantation

If seedlings are to be transplanted from the mother bed:

a) Dip the root portion in CPP manure slurry for 5-10 mts before transplanting to avoid root diseases

b) Select the planting date according to BD Planting Calendar based on the produce to be harvested.

c) Apply good quantity of BD Compost as basal before transplanting the seedlings.

Then while buying the saplings / grafted seedlings make sure that the seedlings are raised from good and selected mother plants

Bio-Dynamic Planting Calendar Usage

The Bio-Dynamic Planting Calendar should be used while planning all garden activities. This helps to utilize the unutilized natural forces (Cosmic forces) for better crop growth and development which once again increase the power of plants to resist any pest and disease incidences. Henceforth, while planning the garden activities follow the guidelines given below:

1. Land preparation – ***descending*** Moon phase,
2. Sowing – ***ascending*** Moon phase, and on a particular constellation of that period based on the produce to be harvested,
3. Planting – ***descending*** Moon phase, and on a particular constellation of that period based on the produce to be harvested,
4. BD Compost & Vermi Compost application - ***descending*** Moon phase,
5. CPP Manure (foliar), BD 501, BD 508 and all herbal extract sprays for plant protection - ***ascending*** Moon phase,
6. Harvest (General) – ***ascending*** Moon phase,
7. Harvesting root crops – ***descending*** Moon phase,

Integrated Pest Management (IPM)

Cultural methods

1. Selection of adopted and resistant varieties,
2. Selection of clean seed and planting materials,
3. Selection of optimum planting and sowing time,
4. Planting with adequate spacing,
5. Use of good water management,

Mechanical methods

1. Field hygiene:
    a. The heavily infected plant parts should be burnt.
    b. Insects and their egg clusters and larval stages can be physically collected & destroyed.
    c. Dropped and decaying fruit should be removed & put in the center of the compost heap.
    d. Over-grown weeds should be slashed and used in compost making.
2. Trap crops should be raised.
3. Installation of bird perches,
4. Use pheromone traps,
5. Use stick traps,
6. Light traps should be used to monitor and control insects,
7. Do companion cropping wherever possible.
8. Use bio-control agents

    Bio-pesticides are advantageous in view of their eco-safety, host specificity, reduce number of application, no resistance development in the insects, and continuous persistence.

9. Use of parasitoids,

S.No	Biological Agents	Pest	Crop
1	Trichogramma brassiliensis - 1.0 cc/ac. once in 10 days, (Egg parasitoid)	Lepidopteran, Heliothis sp	Cotton, Tomato
2	Trichogramma chilonis - 2 cc/ac once in 15 days	Borers	Sugarcane, paddy, pulses, Vegetables
3	Nuclear Polyhedrosis Virus (NPV) 100-200 LE/ac	Spodoptera sp & Heliothis sp	Vegetables
4	Chrysoperla Sp 5000 – 10000 eggs /ha, 3 – 4 times in 15 days, (Green lace wing)	Prudenia, Caterpillars, White flies, thrips, aphids	Vegetables
5	Beauveria bassiana – 1.0% Affects the young stage,	Helicoperva, spodoptera, borers, hairy caterpillars, mites, scales, etc	Vegetables, cereals, fruits
6	Metarhizium anisopliae – 0.5 – 1.0 % affects all stages	White grubs, Beetle grubs, caterpillars, Semiloopers, mealy bugs, BPH	Sugarcane, groundnut, rice, potato, cotton, cereals,
7	Verticillium lecanii – 0.5 – 1.0 %, affects all stages	All sucking soft bodies insects	Sugarcane, groundnut, rice, potato, cotton, cereals
8	Phascilomycetes	Nematodes	All crops
9	Bacillus thuringiensis var kustaki 0.3 – 0.4 %	Helicoperva, spodoptera, borers, hairy caterpillars, mites, scales, etc	Vegetables, cereals, fruits
10	NPV – Nuclear Polyhedrosis Virus of Spodotera litura 250 500 ml/ ha with formulation 10^{10} 2 – 3 time at 10 days interval	spodotera litura	Cotton, groundnut, pulses, cabbage, chillies,
11	NPV – Nuclear Polyhedrosis Virus of Helicoverpa armigera 250 500 ml/ ha with formulation 10^{10} 2 – 3 time at 10 days interval	Helicoverpa armigera	Cotton, groundnut, pulses, cabbage, chillies

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Herbal extracts

Herbal extracts should be used only as a final remedy only after utilizing & practicing all the above said methods. One should try to use only the locally available weeds or those that are grown as life fence for making herbal extracts. If enough materials are not available in and around the garden, then materials can be collected from other areas. To be self sufficient it is better to develop the herbal plant resources by raising them as hedges along the fence, in the waste areas like slopes, gullies, & rocky patches and along the path.

Basic important procedures to be followed while preparing the herbal extracts are:

a) Macerate and grind the plant material to a pulp state. This is mainly to expose the cells and facilitate the extraction of the active principle with the help of water.
b) Soak the pulped material in at least 70-80% of the final volume of spray solution. Since the water has a limited dissolving capacity, with low volume the extraction will not be full.
c) Soak the pulped material only for 3-5 days. If it is allowed to ferment for more number of days the active principles from the herbs that are needed to kill the insects will disintegrate into simpler harmless component.
d) After 3 – 5days of fermentation, the whole solution should be filtered and the final spray volume should be made by adding the balance water.
e) The filtered final solution has to be sprayed in such a way that the whole plant is fully drenched atleast one or two times in a year.
f) To avoid soaking for 3-4 days, soak it atleast overnight and then heat it to a bearable warmth (60-70°C) for an hour by stirring. After this dilute it to the required final volume of spray solution, filter, allow to cool & spray.
g) Use at least 2-3 different materials at a time to prepare the herbal extract.
h) Change the combination of the materials every time.
i) Use 2-3% of herbal extract (combination of 2-3 different materials) while the pest attack is at early stage. Increase the dosage to 5-6% if the attack is very severe.
j) The first two sprays in a season should by a blanket spray, on observing the attack.

k) The second spray has to be repeated in 15 – 20 days interval. Then wait till the infestation starts.

l) Avoid blanket spray after the second spray. Do spot specific/ location specific sprays around the nucleus of the spread of any pest attack.

Commonly available plants that can be used for making herbal extracts are as follows:

Sr. No.	Common Name	Botanical Name	Useful Plant Parts
1	Neem	Azadirachta indica	Neem Cake
2	Pungam	Pongamia glabra Pongamia pinnata	Leaf & flower
3	Notchi	Vitex nugunda	Leaf & flower
4	Nithia Kalyani	Catharanus rosea	Whole plant
5	Unni	Lantana camera	Leaf & flower
6	Devils Trumpet	Datura Metal	Leaf, fruit, flower
7	Yellow Nelliam	Nerium thevetifolia	Flower, fruit, root
8	Aruku	Calatropis gigantea	Leaf, tender stem, flower
9	Siria Nangai	Andrographis paniculata	Whole plant
10	Parthenium	Parthenium sp	Plant before flowering
11	Adathoda	Adathoda vasica	Leaf
12	Tobacco	Nicotiana tobaccum	Dried leaf, plant waste, stem waste
13	Chevanthi	Crysanthemum cinerrifolia	Flower
14	Thumbai	Lucus aspera	Flower, leaf, tender stem
15	Tobacco Plant (weed)	Lobilia sp	Whole plant
16	Ginger	Zingiber officinale	Rhizome
17	Etti	Strychnos nuvomica	Seeds
18	Turmeric	Curcuma longa	Rhizome
19		Artemesia Artemesia vulgaris	Tender shoots & leaves

By continuous practice & observation one can develop many different combinations with the locally available material for different pest attack. Meanwhile already tried and verified combinations are as follows:

Sr. No.	**Herbal Combinations**	**Pest**
a.	Vitex nugundo (2%) + Neem Kernel Cake (1%)	Thrips
b.	Vitex nugundo (2%) + Calatropips gigantia (2%)	Aphids
c.	Neem Kernel Cake (3%)	Leaf eating caterpillar
d.	Nerium thevitifolia (2%) + Vitex nugundo (2%)	Fruit borers
e.	Andrographis panaculata (Siria nangai) (1%) + Neem cake (1%)	Fruit borers & Stem borers
f.	Parthenium sp (3%) + Vinca rosea (1%)	Thrips
g.	Lantana camera (2.5%) + Nerium thevitifolia (1%)	Aphids
h.	Calatropis gigantia (2%) + Lucas aspera (1%)	Leaf eating caterpillar
i.	Nicotiana tobaccum (1%) + Vitex nugundo (1%)	Leaf roller
j.	Calatropis gigantia (1%) + Nerium thevitifolia (1%)	Leaf roller
k.	Gingiber officianale (3%)	Thrips & Aphids
l.	Papaya (3%)	Leaf eating caterpillar
m.	Occimum sp (Thulasi) (3%)	Caterpillars & Spotted leaf beetles
n.	Soak Turmeric 1kg in 10 lt of Cow urine for two days & then dilute it to 100 lt for an acre of crop	Caterpillars and Aphids

Another method is soaking the pulped material in cow urine (10% of the final volume of spray solution) for 15-20 days by burying the mud pot containing the materials in a compost heap. Then dilute it as 1:9 with water, filter & spray.

Integrated Disease Management (IDM)

1. Field Sanitation

   The diseased plants should be collected and burnt at the early stages of any disease spreading.
2. Control the vectors by IPM.
3. Spray BD 501 on Moon opposite to Saturn

   days every month.
4. Dress the seeds with CPP manure slurry – will help to overcome seed borne & soil borne pathogen attack.
5. Dip the roots of the seedlings in with CPP manure slurry to reduce root rot & collar rot diseases.
6. Spray CPP manure as foliar (1.5kg/ac/50 lt water) cone in a month for annuals and once in two months for perennials against leaf rot, leaf blight, fruit rot, sheath blight & sheath rot (as prophylactic and also as a foliar

   nutrition).
7. Spray 2% well fermented buttermilk – Mix 2 lt of well fermented curd (6-7 days) in 98 lt of water and after thorough mixing & potentising by 10-15 minutes of clockwise

   & anti-clockwise stirring.
8. Mixture of Garlic (2%) & Turmeric (1%)

   can also be sprayed.
9. Use BD 508 – Take 1kg of Casuarina equisitifolia or Equisetium arvense or Equisetum ramassisimum and boil it for 2hrs in 10 lts of water. Leave it for two days, dilute it to 100 lts, filter and spray.
10. Bodeaux spray 1.0% can also be sprayed.
11. Use bio-control agents against wilt and rot

    diseases:

    a) Trichoderma viride - 10g/kg seeds or

       Trichoderma harzianum - 10 g/lt for spray

       5 kg/ac for basal dressing

    b) Pseduomonas fluorescens - 5 g/kg seeds, 3 g/lt for spray

       - 2-3 kg/ac for basal dressing

Note: Preferably all the above-mentioned sprays should be done on Full Moon Day & on Perigee, or 1 or 2 days prior to these days.

i) General Precautionary Measures

(against pest & disease control)

1. Avoid irrigation 1 or 2 days prior to Full Moon and Perigee
2. Avoid close planting.
3. Avoid excess application of Nitrogenous manures.
4. Avoid wrong season to raise any crop.
5. Avoid cross hybrid seeds, but use selection hybrids.

Conclusion

Pest and disease management should be carried out in a holistic way by properly planned farming practice. Hence, rather than searching for remedies let us try to identify the cause and rectify it by correct farming methods.

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