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ORIGINAL ARTICLE

Pest management under natural farming

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Abstract

In the green revolution era, the synthetic insecticides were used comprehensively to shield crops from various insect-pests. The justification behind using pesticides is that with the intensive agriculture, the problems of insect-pests are taking complex shape and posing serious challenges. So, the use of pesticides during last few decades has emerged as one of the indispensable agro-inputs to combat insect-pests and concurrently increase crop yields. But scientific surveys and evidences indicate a number of perils associated with the use of such chemicals. Their over and imprudent use lead to resistance in pests, killing of various beneficial organisms like fishes, birds, wildlife, honey bees, pollinators and microbes, poisoning to agricultural farm workers associated with application and spraying of chemicals, contamination of soil, air, surface and ground water, biomagnification of toxicants in food chains, residues in food and feed stuffs and much more. To conquer the deleterious effects of chemical based farming, a more sustainable and innocuous system of farming is required which can reduce the reliance on external inputs and concomitantly take care of the ill effects of pesticides and enhance farm income. Natural farming as suggested by Shri Subhash Palekar, Padma Shri Awardee in 2016, is a viable and sustainable option. In natural farming, insect-pests on plants are managed by the farmers with natural products prepared easily by them from local resources at almost negligible cost. Palekar has emphasized two pronged strategy for plant protection, one of initial protection through seed treatment and second through their use as spray. The naturally prepared and nature-friendly mixtures or astras shall

keep the crop free from insect-pests and diseases and also take cognizance of the venomous effects of pesticides.

INTRODUCTION

In India, the idea of natural farming was pulled into light by Shri Subhash Palekar, for which he was honoured with Padma Shri in 2016. As said by Palekar, it is a method of farming where the cost of growing of plants upto harvesting is zero. This implies that farmers need not to buy fertilizers and pesticides in order to ensure the healthy growth of the crops. This method envisages the use of locally available natural bio-degradable materials saturated with scientific knowledge of ecology and modern technology with traditional farming practices based on naturally occurring biological processes. It is self-nourishing and symbiotic in nature. Over many years of dedicated research, Palekar recommended that:

1. Only the dung from local, Indian cows is effective in the re-enrichment of barren soil. Dung from Jersey and Holstein cows is not as effective as the local one. If one is falling short of dung from local cows, he may even use the dung from bullocks or buffaloes.
2. Dung and urine of the black coloured *Kapila* cow is believed to be miraculous.
3. To get the most out of the cow dung and urine, it has to be ensured that the dung is as fresh as possible (upto 7 days old) and urine as stale as possible (more than 5 days old).
4. An acre of land requires 10 kg of local cow dung per month. Since the average cow gives 11 kg of dung a day, dung from one cow can fertilize 30 acres of land per month.
5. Urine, jaggery and pulse (dicot) flour can be used as additives.

Need of natural farming:

In the green revolution era, the use of high yielding varieties, chemical fertilizers, synthetic insecticides were used extensively to increase the productivity of wheat and rice. High yielding varieties were responsive to high inputs. Moreover, the argument behind using pesticides is that with the intensive agriculture, the problems of insect-pests, and diseases are taking complex shape and posing serious challenges, which have to be dealt with by using synthetic pesticides. So, the use of pesticides during last few decades has emerged as one of the essential agro-inputs to increase crop yields. But scientific surveys and evidences indicate a number of hazards associated with the use of such chemicals. Further, injudicious use leads to resistance in pests and pathogens, killing of various beneficial organisms like fishes, birds, wildlife, pollinators and microbes, poisoning to agricultural farm workers who are associated with application and spraying of chemicals on different crops, contamination of soil, air, surface and ground water, biomagnification of toxicants in food chains, residues in food and feed stuff and much more.

To overcome the noxious effects of chemical based farming, a more sustainable farming system is required which can reduce the dependence on external inputs and simultaneously take care of the ill effects of pesticides and enhance farm income. Natural farming as suggested by Shri Subhash Palekar is a viable and sustainable alternative. The idea is to let nature play a dominant role to the maximum extent possible. Natural farming has been accepted as a state policy in Himachal Pradesh and by 2022, the state government is contemplating to cover all 9.61 lakh families of farmers under natural farming. The pests on plants are managed by the farmers with natural products prepared easily by them from local resources at almost negligible or very less cost. Palekar has detailed the procedures of preparation and application of these man-made concoctions of natural pesticides. As per Palekar, these naturally prepared mixtures or astras will protect the crop from insect-pests and diseases and also simultaneously take care of toxic effects of pesticides.

The two-way strategy recommended for crop protection by Palekar involves seed treatment for initial protection of the crop and sprays of natural inputs either preventive or curative.

A. Beejamrita (Seed treatment): Most of the diseases, insect-pest infestation and other disorders in plants are seed and soil-borne. So, it is important to treat seeds, seedlings or other planting material with beejamrita before sowing to prevent seed and soil-borne diseases and insect-pest infestation in plants.

Method of preparation:

1. Fill a plastic tub with 20 litres water and then slowly add the above mentioned ingredients.
2. Stir the solution for 2-3 minutes with a wooden stick in clockwise direction.
3. Cover the solution with jute bag and keep it overnight.
4. In the morning, stir the solution once again for 2-3 minutes in clockwise direction. Beejamrita is ready to use.

Method of treatment:

1. Treat the seed or planting material before sowing with 200ml beejamrita per kg seed. Spread the seeds of selected crop on a tarpaulin sheet and sprinkle the beejamrita on the seeds to make them properly wet.
2. In case of vegetative propagating crops, put tubers/rhizomes/sets/grafts of selected crop in a bamboo basket and dip the basket in a tub containing beejamrita for 15-20 seconds for treatment.
3. Dry the seeds in shade and use for sowing the next day.

Precautions:

1. Use the prepared beejamrita solution for treatment of planting material within 2 days. Discard the left over solution after 2 days.

Benefits of beejamrita:

1. Use of beejamrita increase germination capacity of seeds.
2. It leads to uniform growth of seedlings and faster development of roots.

3. Plants remain free from seed and soil borne diseases, insect-pests and other disorders.
4. Plants show enhanced tolerance to adverse climatic conditions like low and high temperature, rainfall, hails etc.
5. Plants show increased resistance against insect-pests and diseases throughout their growth period.

B. Natural products for insect-pest control (as sprays) under natural farming

1. Darekastra/Paudhastra: This solution is used to control sucking insect-pests and young caterpillars attacking fruits and vegetables.

Method of preparation: Cut the branches of darek tree along with leaves in small parts. Add 40 litres water, 2 litres cow urine, 400 g cow dung and 2 kg chopped branches in a barrel. Stir the solution for 2-3 minutes in clockwise direction so that all the contents are mixed well. Keep stirring the solution intermittently for 2 days in clockwise direction for 2-3 minutes and then cover with jute bag. After that, strain the solution through a cloth and store in a barrel/drum. This solution can be stored for upto 6 months.

Time of preparation: Under normal environmental conditions in 2 days and during winters in a week

Precautions: Store darekastra in a place away from direct sunlight and rainfall. Spray darekastra in evening.

Rate of application: spray 40 litres in 1 bigha area.

2. Brahmastra: This solution is used to control sucking insect-pests and older larvae infesting crops.

Method of preparation:

1. Take 200 g crushed and ground leaves each of darek, papaya, guava, mango and Duranta in a big vessel.
2. Add 4 litres of cow urine in the vessel and cover it with a lid.
3. Bring the solution to boil on low flame and then remove from the flame and keep it aside for cooling.
4. After 48 hours, store the solution in a container and use upto 6 months.

Precautions:

1. Place the vessel containing the solution away from direct sunlight and rainfall.
2. Spray the solution in evening hours.

Rate of application: 1 litre brahmastra in 40 litres water for 1 bigha area.

3. Agneyastra: This solution is used against pests like fruit borers, root borers and leaf folders that are hidden inside fruits, roots and leaves of plants.

Method of preparation:

1. Take desi cow urine 10 litres, crushed leaves of darek 5 kg, tobacco powder 500 g, chilli powder 500 g and crushed garlic 500 g in a vessel.

2. Heat the solution on low flame till it starts boiling. Then remove the solution from flame and let it cool for 48 hours.
3. Strain the solution through cotton cloth and store in a cool place. The solution can be used for upto 6 months.

Precautions:

1. Store the solution at a place that is away from direct sunlight and rainfall.
2. Spray the solution in evening.

Rate of application: 1 litre agneyastra in 40 litres water for spraying in 1 bigha area.

4. **Dashparni:** This solution is used to control all types of insect-pests infesting crops, fruits and vegetables. It takes care of the difficult to control pests.

Method of preparation:

1. Put 4 litres of cow urine, 400 g cow dung, 100 g turmeric powder, 100 g ginger paste, 5 g asafoetida powder, 200 g tobacco powder in a barrel and cover with a jute bag.
2. Next morning, add 200 g green chilli powder, 100 g garlic paste and 400 g darek leaves. Mix the contents with a wooden stick for 2-3 minutes in clockwise direction.
3. Cover the solution with jute bag for upto 24 hours.
4. Next day, add lantana leaves, Dhatura leaves, papaya leaves, marigold leaves, guava leaves, *bana* leaves, *basuti* leaves, turmeric leaves and ginger leaves each at 400 g in the mixture and cover with jute bag.
5. Stir the mixture for 2-3 minutes every morning and evening for 30-40 days in clockwise direction.
6. Strain the solution through a cloth and store it. The mixture can be used for upto 6 months.

Precautions:

1. Store the solution in a place where sunlight and rain do not fall.
2. Spray the solution in evening.
3. While mixing this solution, cover nose with a cloth.
4. Keep children and cattle away from the place where dashparni is prepared and stored.

Time of preparation:

1. Under normal environmental conditions: 40 days
2. Hilly areas having severe cold: 50-60 days.

Rate of application: 1 litre dashparni in 40 litres of water for spraying in 1 bigha area.

5. **Neem paste:** It is prepared from the leaves and twigs of neem tree, *Azadirachta indica*. All parts of neem tree like seed kernels, flowers, leaves, twigs, bark possess insecticidal activity, seed kernel being most effective. Azadirachtin is the most potent limnoid isolated from neem tree which is

effective against more than 550 insect species. It has properties of repellence, antifeedance, oviposition deterrence, and growth disruption against wide variety of insect-pests belonging to diverse orders. Besides insecticidal activity, neem also displays strong nematocidal, fungicidal, bactericidal and molluscicidal activity.

Method of preparation

Take 50 litres water, 20 litres cow urine, 20 kg cow dung, 10 kg paste of neem leaves, twigs and 10 kg twigs of custard apple and place in a drum. Mix all the ingredients well and keep covered for 48 hours while stirring intermittently. The paste is ready to be used in 2 days period. Use within 7 days of preparation.

Time of application: Apply once in each quarter of the year.

6 Neemastra: It is used to control sucking insect-pests and young caterpillars attacking various crops.

Method of preparation:

1. Crush and grind 5 kg neem leaves/fruits into fine powder and put in a drum.
2. Add 100 litres water in this powder.
3. Pour 5 litres urine of desi cow and add 1 kg cow dung. Stir the mixture with a wooden stick in clockwise direction. Cover the mixture for 48 hours.
4. Stir the solution thrice for 2 days and then strain through a cloth and use it for spraying.

Rate of application: 2 litres in 20 litres of water for 1 bigha area.

Although scanty research reports are available in literature on the use of natural products for managing insect-pests and diseases on crops, but these reports definitely reveal the efficacy of these inputs against various pests. The pests that can't be controlled with chemicals, may be well managed with natural pesticides. More research is needed in this direction to substantiate these results which would strengthen their use. There should be more stress on using these products, either in concoctions or rotations to have better insight in their efficacy. The farmers should be educated about the benefits of using natural products for natural farming in their fields. This will help in convincing them to prepare these with locally available materials and use these natural products at large scale enabling the popularization of natural farming in India and abroad, which would concomitantly take care of the toxic effects of chemical based farming.