

Herbal Spreader Insecticider and Plant Growth Promoter for Organic Farming

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ABSTRACT

The present invention relates in general to the field of treatments for plants, fruits and vegetables, and more particularly, to compositions and methods for the treatment of plant against plant pathogens, eliminate insects and increase the shelf-life of fruits and vegetables.

The various properties of herbal spreader insecticider and plant growth promoter used mainly as insecticide, fertilizer, manure, soil conditioner, urea coating agent, fumigant etc., in recent era the major challenge is to increase the food production without harming the environment and can control the pest. Since, last decades pesticides have become an integral component in sustainable agriculture and the modern cultural practices like use of chemical pesticides and fertilizers are in eliminable.

The natural pesticides from *Azadirachta indica*, *Aloe barbadensis* or *Aloe officinalis*, *Acacia arabica*, Cow urine are considered as less harmful, biodegradable, least persistence, less toxic to non-target organism and also economic. Fruitful results of application of formulated herbal based products in agriculture will provide a cost-effective technology to the farming community.

Keywords: Agriculture; Organic Farming; *Aloe vera*; Gum *acacia*; Neem; Cow urine

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INTRODUCTION

Aim

In order to re-establish previously damaged or destroyed ecological balance in nature, organic farming aims to correct unwanted results of wrong production practices by using; biological methods to control pests and diseases, to improve soil fertility, to contain environment and human friendly production systems, to ban the use of synthetic and chemical fertilizer and pesticides while encouraging organic and green fertilizing, crop rotation and soil conservation

A major challenge of agriculture is to increase food production to meet the needs of the growing world population, without damaging the environment. In current agricultural practices, the control of pests is often accomplished by means of the excessive use of agrochemicals, which can result in environmental pollution and the development of resistant pests. In this context, bio pesticides can offer a better alternative to synthetic pesticides, enabling safer control of pest populations. However, limitations of bio pesticides, including short shelf life, photosensitivity, and volatilization, make it difficult to use them on a large scale ^[1].

Objectives

- To provide food of high nutritional quality in sufficient quantity.
- To work with natural systems rather than dominating them.
- To encourage and enhance the biological cycles within farming system involving micro-organisms, soil flora and fauna, plants and animals.
- To maintain and increase the long term fertility of soils.
- To avoid all forms of pollution that may result from agricultural techniques.
- To maintain the genetic diversity of the agriculture system.
- To consider the wider and ecological impact of the farming system.
- To maintain the ecological balance.
- Maintain soil health.
- Maintain ecological balance.
- Avoid ground water and air pollution.
- Maintain soil and crop productivity.

Need of herbal spreader insecticider and plant growth promoter: Herbal spreader insecticide and plant growth promoter act as potent insecticide and plant growth promoter. This unique combination of organic and herbal extracts is highly effective for removing pest and larva from the crops and it also increase plant absorption of water and nutrients, improving root development and increasing plant enzymatic activity; moreover, PGPR can promote other microorganisms as part of a synergistic effect to improve their effects on plants, promoting plant growth or suppressing pathogens ^[2].

Organic farming

What is organic farming in India?

Organic farming involves a technique, which involves the cultivation of plants and rearing of animals in natural ways. This process the use of biological materials, avoiding synthetic substances to maintain soil fertility and ecological balance thereby minimizing pollution and wastage.

Organic farming in India is an agricultural process, uses pest control derived from organic manure and animal or plant waste. This farming started to respond to the environmental suffering caused by chemical pesticides and synthetic fertilizers. It is a new system of agriculture that repairs, maintains, and improves the ecological balance. Organic farming uses organic inputs, green manures, cow dung, etc.

Principles of organic farming

Organic agriculture grows and develops with these principles. These can contribute to improving organic agriculture for the world.

There are four principles of organic farming are as follow:

- **Principles of health:** The health of the ecosystem, people, and communities.
- **The principles of ecology:** The right balance between ecosystem and environment or nature.
- **Principles of fairness:** Good human relationships and quality of life.
- **Principles of care:** The considerations about the environment and environment of the future.

Types of organic farming

Organic farming is two types. Have a look down below on the type of organic farming in India.

Pure organic farming: In pure organic farming, there is avoiding every unnatural chemical. In the process of pure farming, fertilizer and pesticides obtain from natural sources. It is called a pure form of organic farming. Pure organic farming is the best for high productivity ^[3].

Integrated organic farming: Integrated organic farming consists of integrated nutrients management and integrated pest management.

Characteristics of organic farming:

- Maximum but sustainable use of local resources.
- Minimum use of purchased inputs.
- Ensuring the basic biological functions of soil, water, nutrients and humus.
- Increasing crop and animal diversity in the form of agroforestry systems, integrated crop/livestock systems etc.

Advantages of organic farming:

- Organic manures produce optimal conditions in the soil for high yield and good crop quality.
- They supply primary, secondary and micro-nutrients to crops.
- They improve growth and physiological activities of plants.

- They improve physic-chemical properties of soil.
- Addition of organic carbon in the organic matter is the source of energy for microbes which help in better soil aggregation.

Key features of organic farming:

- Protecting soil quality using organic material and encouraging biological activity.
- Indirect provision of crop nutrients using soil microorganisms.
- Nitrogen fixation in soils using legumes.
- Weed and pest control based on methods like crop rotation, biological diversity, natural.
- Predators, organic manures and suitable chemical, thermal and biological intervention.
- Rearing of livestock, taking care of housing, nutrition, health, rearing and breeding.
- Care for the larger environment and conservation of natural habitats and wildlife [4].

Information about Ingredients

Introduction of neem: India is an agriculture based country, where 40% of income is based on agriculture Out of 100, 60 families are agriculture families, if they see back their family history. Every Indian comes from an agricultural family background as India is a highly populated country, it may require 250 million tonnes of food by 2015 AD which very difficult comparing the current circumstances it very tough to serve the food needs of each Indian.

The neem tree (*Azadirachta indica* A. juss) and its derivatives have great relevance in organic farming practices. This remarkable tree has been identified as a renewable resource for home grown agro chemicals and nutrients which are bio degradable, non-toxic and effective (Figure 1) [5].

Figure 1. Neem tree.



Neem in crop management: Neem plays a vital role in crop and pest management. The use of neem in the form of neem fertilizers, insecticides, neem seed cake, neem pesticides, neem manure, neem soil conditioner, neem bio control agents etc., treat problems of significant field crops, pests in field crops. Neem helps in controlling the growth of pests and insects in crops, thereby helps in overall increased productivity of agriculture [6]. Neem is a well-known crop and pest manager, treating efficiently a large variety of crops and plants and also is an excellent insect/pest

growth inhibitor. Every part or product of the neem tree (*Azadirachta indica*) (i.e., leaves, oils, stem, barks, oilcake, sawdust etc.) have been shown to have a significant role to play in pest management [7].

Neem insecticides: The transition from use of synthetic products to natural ones is evident in agricultural industry also; excessive use of synthetic insecticides has resulted in a number of serious problems like development of insect resistance to insecticides, harm to other natural enemies of insects, toxic effects on plants and soil etc.

Neem organic/bio insecticides: Neem is being used to manufacture what is known as the natural or bio insecticide, that are environmentally friendly and do not have any toxic effects on plants and soil. Neem insecticide are used to protect both food as well as cash crops like rice, pulses, cotton, oils seed etc. Great for use on all crops, trees, plants, flowers, fruits, veggies round the home as well as organic and commercial growers [8].

Active ingredient Azadirachtin, found in neem tree, acts as an insect repellent and insect feeding inhibitor, thereby protecting the plants. This ingredient belongs to an organic molecule class called tetranortriterpenoids. It is similar in structure to insect hormones called "ecdysones," which control the process of metamorphosis as the insects pass from larva to pupa to adult.

It is interesting to note, that neem doesn't kill insects, but alters their life process.

Parts of neem seed to manufacture insecticides

Neem oil insecticide: The major parts/extracts of neem seed that are used for making neem insecticides are the neem seed kernels and the neem seed oil.

Neem seed kernels: According to recent studies conducted on parts of neem, it was found that neem seed extracts contain azadirachtin, which in turn works by inhibiting the development of immature insects.

Neem oil: Neem oil or the neem seed oil is extensively used to manufacture insecticides used for different crops. Neem oil enters the system of the pests and obstruct their proper working. Insects do not eat, mate, lay eggs resulting in the breaking of their life cycle. Another interesting function of neem oil pesticides is that they do not harm the beneficial insects. The neem oil insecticides only target the chewing and sucking insects.

Neem bio control agents: Bio control agents are nothing but pest control agents; neem is being used in agriculture to manufacture natural pest control agents for its safety, effectiveness and low cost. It is more effective than its synthetic counterparts. Properties of neem help to naturally control the pest growth rate. It is being commercially produced on large scale in organic farming and agriculture for best results.

Neem soil conditioner: Neem is a natural soil conditioner that helps improve the quality of soil, thereby enhancing the growth of plants and fruits. It not only helps the plants grow, but also prevents them from being destroyed by certain pests and insects.

Organic soil conditioner is gaining popularity in agricultural industry, not only in Asian countries like India but also the

western counterparts such as USA, UK and Australia. This is so, because they are organic, have no harmful effects and cheaper than the other soil conditioners. This natural soil conditioner is also multi-functional.

Agriculture uses of neem: Neem is recognized today as a natural product which has much to offer in solving global agricultural, environmental and public health problems. It is considered as a valuable instrument for sustainable development.

Researchers worldwide are now focusing on the importance of neem in the agricultural industry. The magical tree and hundreds of its active compounds are used to manufacture a number of products. Natural properties of neem do not have any toxic reactions, so they are helpful in plant protection and management.

Neem seeds, neem leaves and leaf extracts are widely used in agriculture. Products derived from Neem tree act as powerful Insect Growth Regulators (IGR) and also help in controlling several nematodes and fungi. Neem products reduce insect's growth in crops and plants.

Neem uses in organic farming-how does neem work on insects?

- Neem slowly works on the hormonal system of insects; it destroys the production of eggs or larvae.
- Neem controls the molting of larvae and repelling larvae and adults.
- Neem has the power to reduce the matting and sexual interaction in insects.
- It also kills the fertility power in insects and prevents female insects from laying eggs.
- Neem can stop the feeding power insects and poisoning larvae.
- Neem shows a huge impact on chitin formation and metamorphosis.
- Neem interrupts the swallowing capacity of the insect.

Introduction of gum acacia

Gum arabic, also known as acacia gum, is a natural plant derived gum produced from the dried sap of several species of acacia trees. The major component of gum Arabic is arabinogalactan, a biopolymer of arabinose and galactose monosaccharides.

Gum arabic is one of the herbal bio polysaccharides, which is extracted from acacia arabica (family, Leguminosae). The molecules of gum Arabic are reported for their branched polysaccharide based structure having various sugars-such as arabinose, rhamnose, galactose, glucuronic acid, etc. In addition, gum arabic contains protein materials and moisture contents. Gum arabic is reported for its biodegradability, and biocompatibility. Since long, it has widely been employed as thickener, additives, emulsifier, and suspending agents in various foods, cosmetics and pharmaceutical products, agrochemical industry. On account of the cost effectiveness, it has already been employed as cost-effective excipient in the formulations of many drug delivery dosage forms.

Gum arabic has proved its usefulness as prospective bio polysaccharidic excipient material as binder, filler, disintegrant, matrix former, release retardant, etc., in various pharmaceutical tablets containing various kinds of drugs (Figure 2)

Figure 2. Gum acacia formation to the tree branch.



Acacia gum is not used as a real thickening agent. Its viscosity is low, even at high concentration (100 mPa s-brookfield at 25% in water), compared to other colloids such as modified starches or gelatine.

Gum arabic is a valuable agrochemical material and receives an increasing recognition in biomedical fields due to its easy availability, and nontoxic and biodegradable nature. Gum arabic and its composites offer distinct and beneficial properties, which facilitate their utilization in a wide range of agro industries, including in foods, paints, textiles, printing, pharmaceuticals, and biomedical domains.

Introduction of *Aloe vera*

Aloe Vera benefits to plants growth and root development in addition to human use, we can apply the stellar properties of *Aloe vera* to benefit other plants like those in your garden! *Aloe* contains plant hormones that help stimulate new root growth, aid in seed germination, and can ease or prevent transplant shock.

Aloe vera fertilizer can encourage seed germination and rapid root development, improved cell strength, and contribute to overall superior plant health, growth, and vigor! In fact, *aloe* is so great at promoting growth that it's commonly used as a natural rooting hormone, used to help plant cuttings establish new roots.

Traditionally, this medicinal plant has been employed to treat skin problems (burns, wounds, and anti-inflammatory processes). Moreover, *Aloe vera* has shown other therapeutic properties including anticancer, antioxidant, antidiabetic, and antihyperlipidemic (Figure 3).

Figure 3. *Aloe Vera*.



***Aloe Vera* benefits to plants**

Growth and root development: In addition to human use, we can apply the stellar properties of *Aloe vera* to benefit other plants like those in your garden! *Aloe* contains plant hormones that help stimulate new root growth, aid in seed

germination, and can ease or prevent transplant shock. We try to water our newly transplanted seedlings with *Aloe vera*, especially if they're looking stressed. Another way to prevent transplant shock is properly hardening off indoor seedlings before they are planted outdoors.

As a nutrient accumulator, *Aloe vera* is reported to contain over 75 active constituents, including amino acids, enzymes, lignin's, polysaccharides, minerals, vitamins (A, C, E, and B2, 3, 5, 6, and 12) along with choline, calcium, magnesium, zinc and more. These things combined make aloe a natural, mild but potent "fertilizer" for plants.

This super food like tonic can be used for enhancing root development, cell strength, and overall plant vitality!

Seed germination: *Aloe vera* is not only a rooting agent, but also promotes healthy seed germination and strong seedlings. Watering your seeds and seedling once in a week will improve the overall growth and yield. Mix 1 teaspoon of *aloe vera* gel per litre of water or 1 table spoon per gallon. Spray this over the seedlings or water them once weekly.

Plant Immunity: *Aloe vera* gel is fully loaded with over 75 beneficial useful nutrients and enzymes like amino acids, antioxidants, calcium, magnesium, zinc, salicylic acid and so on. High levels of ace-Mannan and saponin found in *aloe vera* both provide antibacterial, antifungal, and antiviral properties. This helps to protect plants and confers resistance or immunity against certain harmful microbes, fungi, yeast, mold, blight and so on. Just water the plant once in a while like once in a month with *Aloe vera* solution and see the difference.

It not only gives resistance against diseases but also boosts overall growth and health of the plant. Add 1 table spoon of *Aloe vera* gel per liter of water or a quarter cup per gallon of water, mix it well and water your plant. If you start this in early growth stage of a plant, it's actually much beneficial in the long run.

Transplant shock: Certain high levels of antibacterial, antifungal, and antiviral compounds found in *Aloe vera* help plant recover from transplant shock. A plant goes into transplant shock when you repot it or transplant it from one place to another. The plant looks wilted and unhealthy after transplant. To help recover from this shock, you can water your plant with *Aloe vera* solution at least once after repotting. Repeat after 3-4 days if necessary. Add 1 table spoon of *Aloe vera* gel per liter of water or a quarter cup per gallon of water, mix it well and water your plant.

Fertilizer: You can either make a soil drench or a foliar spray. To make a soil drench, take some fresh *Aloe vera* leaves and cut them into pieces and throw them into the blender and add some water. You don't need to peel them. Add half a cup of this gel to one gallon of water or 2 table spoons per liter of water and water your plants with this solution once 15 days. Make sure you drench this within half an hour of making, because if exposed to air, fresh *Aloe vera* quickly ferments and begins to degrade.

The second preparation is a foliar spray or foliar feeding your plants to help them absorb these beneficial nutrients directly through the leaf stomata. You need to make a fresh *Aloe vera* solution like one table spoon per liter of water or quarter cup per gallon. You can sieve this to prevent your sprayer getting clogged. Mix it well before spraying. Spray more on the underside of the leaves because leaf stomata or openings are more concentrated on the underside. Spray this in the evenings to avoid quick evaporation in the presence of sunlight.

Natural rooting agent: The salicylic acid and other anti-bacterial and anti-fungal compounds help promote rooting

faster.

There are many methods to use *Aloe vera* for rooting: Let's look at them one by one:

- Dipping the cuttings into fresh *Aloe vera* gel and inserting into soil. I recommend you soak the cutting for few hours into *Aloe vera* gel and then plant the cuttings into soil. This will not only promote faster root development but also the success rate of rooting cuttings is high because *Aloe vera* fights fungal rot.
- Second method is just inserting the cutting into a small piece of *Aloe vera* leaf and plant the whole thing into the soil to achieve the same results.
- A piece of *Aloe vera* can be used for air layering to multiply your favourite plants with great success rate. Just wrap a piece of *Aloe vera* leaf and wrap around soil or toilet paper and tie the ends.

Pesticide: *Aloe vera* alone may not act as a potent pesticide to fight all pests and diseases. You need to other natural agents to make it a powerful organic pesticide that fights common garden pests like aphids, mealybugs, whiteflies and so on.

Introduction of cow urine

Cow urine is a unique product with multiple uses. Cow urine has many beneficial properties particularly in the area of agriculture. Organic Agriculture is now becoming the new boom all over the world. The noteworthy aspects of cow urine are its eco-friendly nature, easy accessibility and multiple uses.

The use of cow urine is known for a long time in India. Cow urine has been described as a liquid with innumerable therapeutic values, capable of curing several incurable diseases in human beings and also in plants.

It has been considered that cow urine is very useful in agricultural operations as a bio fertilizer and bio pesticide. It is rich source of macro and micronutrients, disinfectant and prophylactic properties thus purify the atmosphere and improve soil fertility.

Cow urine therefore, could be an effective tool to address multi nutrient deficiencies in most of soils in the country. It is believed to provide nutrients to plants at low cost; therefore, it is considered an alternative for plant nutrition, metabolic activation, pest and disease control.

The exploitative agriculture for centuries in our country has brought down the fertility status of the soil to a level that even the application of fertilizers at higher rates is unable to sustain the productivity of soil. Intensive use of chemicals gives an immediate effect on crop production for small duration but creates long term ill effects on soil health leads to environmental problems.

It is unfortunate that with the advent of fertilizers, slowly Indian farmers have forgotten use of cow products in agriculture and thus facing the current crises. chemical fertilizers alone do not provide all the nutrients in balanced quantities needed by the plants and on the other hand encourage depletion of soil organic matter content, adversely affect biological and physical properties of soil, also their increasing prices, soil health deterioration, sustainability and pollution consideration in general have led to renewed interest in the use of organic manures.

The uric acid in the urine acts as fertilizer and hormone. Cow urine has antibacterial, antifungal, antiviral properties;

hence it is most effective secretion of animal origin with multitudinous therapeutic values it also purifies and enhances soil fertility. However, cattle urine has a good manorial value and can be utilized as a bio fertilizer.

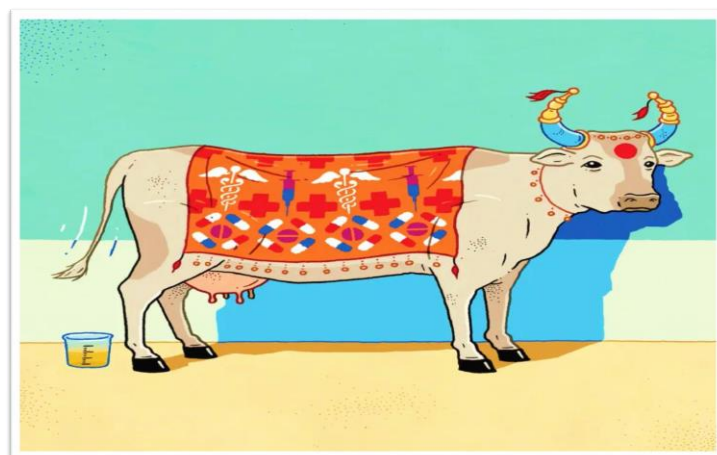
On one hand chemical fertilizers alone do not provide all the nutrients in balanced quantities needed by the plants and on the other hand encourage depletion of soil organic matter content, adversely affect biological and physical properties of soil, also their increasing prices, soil health deterioration, sustainability and pollution consideration in general have led to renewed interest in the use of organic manures.

Application of cow urine besides improving the soil texture and working as a plant hormone also been reported to correct the micronutrient deficiency, being organic in nature it is also likely increase the fertilizer use efficiency.

The use of organic manure not only helps to sustain crop yields but also plays a key role by exhibiting both direct as well as indirect influence on the nutrient availability in soil by improving the physical, chemical and biological properties of soil and also improves the use efficiency of applied fertilizers.

The use of organic manure not only helps to sustain crop yields but also plays a key role by exhibiting both direct as well as indirect influence on the nutrient availability in soil by improving the physical, chemical and biological properties of soil and also improves the use efficiency of applied fertilizers (Figure 4).

Figure 4. Cow urine.



Cow urine as a fertilizer: Cow urine can be used as a foliar spray or applied to the soil. Nitrogen, phosphorus and potassium are the three major nutrients required for healthy plant growth. Cow urine contains significant amounts of both nitrogen and potassium.

Composition: Cow urine contains 95% water, 2.5% urea, and 2.5% minerals, salts, hormones and enzymes. It contains iron, calcium, phosphorus, salts, carbonic acid, potash, nitrogen, ammonia, manganese, sulphur, phosphate, potassium, urea, uric acid, amino acids, cytokines, lactose etc.

Research shows that only 20% of nitrogenous materials consumed by cattle are absorbed and 80% is excreted in urine and dung. 52% of Nitrogen returns in the form of urine while 28% return in form of dung. 61%-87% phosphorus and 82-92% potash was also obtained from cow urine. In 24 hours, a cow can give 6 liters of urine. If a farmer can have 2

cows in her/his farm, it gives 4380 liters of urine in one year which equals 65 kg nitrogen, that amount of nitrogen equals to 136 kg urea.

Salient features of cow urine:

- An approach towards sustainability.
- Expense free farming.
- Producing quality and poison free food.
- Agriculture without external input.
- Farming in tune with nature.
- Protecting soil fertility and soil health.
- Maintaining the level of organic matter.
- Encouraging biological activity in soil.
- Providing nutrients through the microbial action.

Positive Impacts of Cow Urine on soil properties and plants:

Micronutrients increase in soil after application of cow urine.

- Colour of leaves is more green compare with the use of urea application.
- Residual effect of cow urine is present in next crop.
- Improves the soil texture.
- Creates good environment in soil for earthworm growth.
- It serves as growth promoter of plants.
- Cow urine sprayed after 14 days of storage in cool place works as an insecticide against aphids and other insects.
- The spraying of urine not only provides nitrogen for plants but also protects the plants from aphid and other insects and provides resistance to diseases.

Effects of cow urine on different aspects

Growth parameters: Application of cow urine accelerates the different aspects of growth in several crops. Cow urine at 5 and 10% concentration significantly improve all vegetative growth like increasing emergence of plant, height, number of leaf's, length and width of leaves.

In traditional farming, cow urine had been in the form of FYM after mixing in cow dung. Application to soil at 20 ml/plant, cow dung slurry solution helps to increase the growth of plants.

Nutrient content and uptake: The nutritional effect of cow urine showed increased chlorophyll and protein content with increased concentration of urine as compared to control.

The urine increased the N, P and K uptake concentration of grass.

Physical and chemical properties of soil: Cow urine application has also reported to improve the soil texture and structure. High dose of liquid cow manure application resulted in increased pH and EC values, nutrients and dissolved organic carbon content of amended soils. Significantly increase soil organic carbon (0.58%), available nitrogen (272.4

kg ha⁻¹), phosphorus (23.5 kg ha⁻¹) and potassium (199.9 kg ha⁻¹) with application of FYM 12.5 t ha⁻¹+cattle urine at 34300 l ha⁻¹.

Soil microbiology: Compost tea (cow dung+cow urine+water) contains high amounts of microbes which have complementary effect on the native microbes and also favours decomposition of organic matter at a faster rate which, result in better transformation of nutrients and their availability to crops. Showed that after regular use of cow urine in the crops farmers found that soil microorganism population increased along with the crop yield.

Biopesticides: Due to high content of urea in it which is toxic to most of the organisms, the pests etc. will not attack the leaves and buds of the crop plants. Due to pungent and bad smell of the extract, most of the pests and insects, which are attracted due to nectar and fragrance, get repelled, preventing the plant.

Post-harvest parameters: Cow urine at 5 and 10% concentration significantly improved all post-harvest parameters of gladiolus viz. percent opened flower in vase, diameter of basal floret, shelf life and vase life of cut spikes as compared to control.

MATERIALS AND METHODS

Materials

- *Aloe vera*
- Gum acacia
- Neem
- Cow urine

Method of preparation

Weigh accurate quantity of each and every herbal ingredient of neem, *Aloe vera*, gum acacia and cow urine. Formulation of herbal spreader insecticider and plant growth promoter was done as per formula given in Table 1. All the component was homogeneously mixed. Consider for formulation take *Aloe vera* juice. Then add the neem extract, prepared homogeneous mixture of ingredient like (*Aloe vera*, gum acacia, neem extract, cow urine) thoroughly with continuous stirring. For improvement of quality, safety and efficacy in the formulation, sufficient quantity water was added and keep aside for 5 minutes (Figures 5-7).

Formulation table:

Table 1. Compostion of spreader insecticider and plant growth promoter.

| Sr. No. | Ingredient | F1 | F2 | F3 | F4 | F5 |
|---------|------------------|-------------|---------------|---------------|--------------|---------------|
| 1 | <i>Aloe vera</i> | 10% (25 ml) | 15% (37.5 ml) | 17% (42.5 ml) | 20% (50 ml) | 22% (55 ml) |
| 2 | Neem | 8% (20 ml) | 10% (25 ml) | 12% (30 ml) | 14% (35 ml) | 15% (37.5 ml) |
| 3 | Cow urine | 6% (15 ml) | 7% (17.5 ml) | 9% (22.5 ml) | 10% (25 ml) | 10% (25 ml) |
| 4 | Gum acacia | 3% (7.5 gm) | 4% (10 gm) | 5% (12.5 gm) | 5% (12.5 gm) | 6% (15 gm) |

| | | | | | | |
|---|-----------------|--------|--------|--------|--------|--------|
| 5 | Vehicle (Water) | Q. S | Q. S | Q. S | Q. S | Q. S |
| | Total | 250 ml | 250 ml | 250 ml | 250 ml | 250 ml |

Figure 5. Ingredients are mixed and prepared organic formulation for organic farming.



Evaluation parameter

Figure 6. Before spraying the formulation.



Figure 7. After spraying on formulation of herbal spreader insectisider and plant growth promoter.



RESULTS AND DISCUSSION

Observation

The herbal spreader insecticide and plant growth promoter collected and stored in a suitable plastic container before

used to perform evaluation parameters for best result. The best insecticidal, pest control and plant growth performance was demonstrated by formulation No-5, which we evaluated against other batches. The results of the evaluation showed that formulation No-5 has a significant result of insecticide, pest control, plant growth promoter as compared to the other batches. This concluded that the neem, *Aloe vera*, cow urine, acacia used in insecticide, pesticide and plant growth promoter formulations in No-5 shows optimum results (Figure 8).

Figure 8. Result after using formulation.



According to the present study the results of the evaluation parameter shows that formulation no-5 had a significantly lower level insect, pest, viruses. From this investigation, it was concluded that the formulation of an herbal spreader insecticide and plant growth promoter contains all the good characteristics of an ideal insecticide, pest control, plant growth property and its environment friendly property.

Summary of the invention

The present invention includes compositions and methods for the treatment of plants using herbal spreader insecticider and plant growth promoter. It has been found that the present invention is a bio-degradable, non-toxic growth promoter.

The *Aloe vera*, neem, gum acacia, cow urine compositions of the present invention repel insects and other pests that affect plant and fruit growth. While hundreds of thousands of tons of pesticides are used by the agricultural and forestry industries every year, the industrial chemicals used are toxic, often non- biodegradable, enter water and food sources and their long term impact on the environment is, at best unknown and in other cases known to be detrimental.

The present invention uses, for the first time, to treat herbal spreader insecticider and plant growth promoter to increase the size and biomass of plants. The treatment method and location include, e.g., the leaves, stalk, roots and as a soil treatment.

The present invention includes compositions and methods for the treatment of plants, fruits and vegetables to increase their shelf life, repel unwanted parasites. In one embodiment, the present invention includes a method for treating plants by identifying a plant in need of treatment against a pathogen or pest and coating the plant with

undiluted untreated gelatinous material from herbal spreader insecticider and plant growth promoter.

The herbal spreader insecticider and plant growth promoter may be a liquid. The herbal spreader insecticider and plant growth promoter may be freeze dried, heat dried, vacuum dried, air dried, spray dried and combinations thereof for use or may be mixed for form a gel or a liquid. In some cases, stabilizer, an anti-oxidant, a water repellent, a UV absorbing material and/or an anti-microbial agent (e.g., anti-viral, anti-bacterial, anti-fungal, anti-helminth) may be added to the herbal spreader insecticide. Often the plant will be coated *in situ*.

By plant it is meant herein to include trees (monocots and dicots), plant cells, plant tissue, seeds, seedlings, grafts, fruits, vegetables, sexually or asexually reproducing plants, hybrids, transgenics and the like.

CONCLUSION

The present studies conclude that the use of herbal spreader insecticide and plant growth promoter with proven safety and efficacy on the plant and treatments for plants, fruits and vegetables, and more particularly, to compositions and methods for the treatment of plant against plant pathogens, eliminate insects and increase the shelf life of fruits and vegetables.

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