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(54) Title: SYNERGISTIC FUNGICIDAL COMPOSITION COMPRISING STROBILURIN AND TRIAZOLE FUNGICIDES WITH SULPHUR

(57) Abstract: The present invention relates to a synergistic fungicidal composition comprising at least one strobilurin fungicide in the range of 5 to 50 wt%; at least one triazole fungicide in the range of 5 to 70 wt%; and Sulphur in the range of 1-7 wt% along with agrochemically acceptable adjuvants. The present invention further relates to a synergistic fungicidal composition comprising at least one strobilurin fungicide in the range of 5 to 50 wt%; at least one triazole fungicide in the range of 5 to 70 wt%; and Sulphur in the range of 1-7 wt% which uses organosilicone surfactants as spreading and sticking agents and bio based efficacy enhancing agents. The present invention also relates to a process for preparation of such synergistic fungicidal composition.

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SYNERGISTIC FUNGICIDAL COMPOSITION COMPRISING STROBILURIN AND TRIAZOLE FUNGICIDES WITH SULPHUR

FIELD OF THE INVENTION

The present invention relates to a synergistic fungicidal composition comprising bioactive and effective amounts of at least onestrobilurin fungicide or its agrochemically acceptable salts; at least one triazole fungicide or its agrochemically acceptable salts; and sub-fungicidal amount of Sulphur. Particularly, the present invention relates to a synergistic fungicidal composition comprising at least one strobilurin fungicide in the range of 5 to 50 wt%; at least one triazole fungicide in the range of 5 to 70 wt%; and Sulphur in the range of 1-7 wt% along with agrochemically acceptable adjuvants. The present invention further relates to a synergistic fungicidal composition comprising at least one strobilurin fungicide in the range of 5 to 50 wt%; at least one triazole fungicide in the range of 5 to 70 wt%; and Sulphur in the sub- fungicidal active range of 1-7 wt% which uses organosilicone surfactants as spreading and sticking agents and bio based efficacy enhancing agents. The present invention also relates to a process for preparation of such synergistic fungicidal composition comprising a combination of fungicides and sub-fungicidal active amount of Sulphur present as a catalyst/performance enhancer which uses organosilicone surfactants/Silicone Ethoxylated Oil as spreading and sticking agents and bio based efficacy enhancing agents.

BACKGROUND OF THE INVENTION

Fungicides are compounds, of natural or synthetic origin, which act to protect plants against damage caused by fungi. Current methods of agriculture rely heavily on the use of fungicides. In fact, some crops cannot be grown usefully without the use of fungicides. Using fungicides allows a grower to increase the yield and the quality of the crop and consequently, increase the value of the crop. In most situations, the increase in value of the crop is worth at least three times the cost of the use of the fungicide.

Most crop and ornamental plants are subject to attack by several fungi. Damage due to plant pests to ornamentals, vegetable, field, cereal and fruit crops can cause significant reduction in productivity and thereby result in increased cost to the consumer. In addition to often being highly destructive, plant fungi can be difficult to control and may develop resistance to indiscriminate use of commercial fungicides. The diversity of these organisms and their potential for inciting serious disorders in combination or singly has resulted in the need for broad-spectrum disease control tools. Although there are available numerous chemical compounds (fungicides), which aid in preventing diseases of plants, each of these has practical deficiencies, which restrict its use. Furthermore, certain rare combinations of fungicides demonstrate a greater-than-additive (i.e. synergistic) effect to provide commercially important levels of plant disease control.

The main concern with the repeated use of fungicide in solo formulations is the development of resistance by the pests for that particular fungicide and at the end one has to apply more concentrated formulation of the fungicide. The high amount of fungicide may result in the toxicity to human beings as well as have bad effects on the environment.

When two or more substances in combination demonstrate unexpectedly high biological activity, for example fungicidal activity, the resultant phenomenon may be referred to as synergism.

In order to achieve the high crop productivity, it is important to control the plant from damages which can be caused by plant fungi and other pathogenic (disease-causing) organisms. Although there are available numerous chemical compounds (fungicides), which aid in preventing diseases of plants, each of these have practical deficiencies, which restrict its use or warrants repeated applications.

Further demands on fungicidal compositions include reduced phytotoxicity, reduced dosage, increased uptake of active ingredients for faster control, increased shelf-life and stability of the fungicidal formulation, substantial broadening of spectrum and increased safety, to name a few.

The biological properties of known compounds are not entirely satisfactory in the areas of plant pest control, environmental and worker exposure, for example in particular, it has been observed that pathogens become resistant to pesticides which are at times administered in higher dosages to achieve the desired control, thereby leading to soil toxicity and other environmental hazards, besides higher costs.

Combinations of fungicides are often used to facilitate pest control, to broaden the spectrum of control and to retard resistance development. Accordingly, new advantageous combinations are needed to provide a variety of options to best satisfy multiple plant pest control needs. Further, there has been a need in the art to provide a synergistic pesticidal composition with a combination of fungicides with higher uptake of A. I with enhanced efficacy, reduced toxicity and increased shelf life and stability. There is a need for a synergistic combination which can provide broad spectrum control while having reduced rate of application and dose and yet provide enhanced disease control efficacy resulting in enhanced plant/crop yield.

Conventional fungicide compositions sometimes do not show a practically sufficient control effect on plant pests depending on an applying situation, since it has an insufficient effect on particular plant pathogenesis either by working slowly against the targeted pathogens or its residual effectiveness lasts for a relatively short period. In view of the above, obtaining a fungicidal combination which demonstrates no cross-resistance to the existing fungicidal agents, no toxicity problems and little negative impact on the environment with improved rainfastness and reduced pest resistance, is extremely difficult.

Apart from synergistic effect and increased bio-efficacy, to draw the dose optimization and reduction in cost per hectare (ha), it is also important to have a crop solution which entrusts the resistance management which results very often in various pesticides due to repeated spray rounds during the single crop cycle.

Further, in the agrochemical industry, Sulphur is used as a non-systemic contact and protectant fungicide with secondary acaricidal activity. Sulphur is also used to make fertilizers which is essential for plant growth. However, Sulphur when used as fungicide or as fertiliser in very high doses (is toxic to plants at critical growth stages especially during flowering and fruitling. However, use of Sulphur as catalytic and having preservative properties when used in extremely reduced dosages, is not known in the art

Thus, there has been a need to provide a fungicidal composition with a combination of fungicides and reduced amount of sulphur which are compatible with each other in terms of stability but still provide enhanced efficacy and synergistic effect over the solo and/ or binary formulations of the respective active ingredients.

Thus, it is an objective of this invention to provide a synergistic fungicidal composition with a synergetic combination of fungicides and a catalyst/ performance enhancer which demonstrates increased uptake of active ingredients, high and faster disease control efficiency, with broad spectrum control, reduced plant toxicity, along with reduced crop protection cost and reduced environmental load along with increased shelf life and stability of the formulation.

An object of the present invention is to provide a fungicidal composition having a remarkably improved control effect on plant pathogenesis by combining fungicides and reduced amount of sulphur which acts as a catalyst/ performance enhancer and a method for controlling a plant infestation and thus, providing a broad-spectrum fungicide control which has increased uptake of active ingredient, is efficacious with low inhalational and dermal toxicity and has longer shelf life and enhanced stability.

Further, it is known in the art that certain, agrochemical formulations especially fungicidal compositions which are prepared are not stable and use volatile organic compounds, which are harmful to plant health and the environment. It is seen in the art that compositions comprising strobilurin fungicide and/or triazole fungicide with Sulphur use surfactants and solvents, spreading agents which are based on volatile organic compounds (VOCs) and hence are not eco-friendly and are toxic to the plant health. Thus, in order to further increase the spreading and penetration of the active fungicidal components with Sulphur, there has been a need in the art to arrive at stable, non-toxic and penetration enhancing fungicidal formulation with superior absorption, penetration, rainfastness and spreading properties which render the formulation as most efficacious and a superior fungicidal formulation.

Existing fungicidal compositions involve usage of adjuvants which do not promote enhanced efficacy and penetration and spreading of the actives on plant surface with improved rainfastness. Thus, it is further an object of the invention to provide a fungicidal composition which uses organosilicone surfactants such as trisiloxane ethoxylate; Silicone Ethoxylated Oil as spreading and sticking agents and bio based efficacy enhancing agents such as natural oils including blend of polyterpene resin. Therefore, it was surprising and unexpected that an agrochemical formulation(fungicidal composition) that includes organosilicone surfactants such as trisiloxane ethoxylate as spreading and sticking agents and bio based efficacy enhancing agents such as natural oils including blend of polyterpene resin with surfactant, distilled tall oil based green adjuvant, would provide a suitable formulation with enhanced sticking, rainfastness and penetration/efficacy properties.

Reference may be made to US patent no. US9538761, wherein it discloses a pesticidal composition comprising sulphur, a fungicide selected from the group consisting of cymoxanil, fenhexamid, fenamidone, cyazofamid, chlorothalonil, kresoxim methyl, azoxystrobin, trifloxystrobin, pyraclostrobin, iprodione, validamycin, kasugamycin, cyprodinil, pencycuron, hexaconazole, prochloraz, epoxiconazole, prothioconaozole, trifloxystrobin, thiophanate methyl, spiroxamine, metrafenone or their salts thereof and at least one agrochemically acceptable excipient.

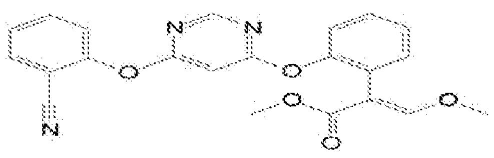
Reference may be made to Chinese patent no. CN110710532, wherein it discloses a sterilization composition containing Trifloxystrobin and Difenoconazole in reducing or preventing citrus plants from being infected by toxins formed by aschersonia fungi, wherein the weight ratio of the Trifloxystrobin to the Difenoconazole is 20:1-1: 20.

Reference may be made to Chinese patent no. CN103947650, wherein it discloses a bactericidal composition containing Trifloxystrobin and Difenoconazole and application of the bactericidal composition. In the composition, the Trifloxystrobin and the Difenoconazole are compounded and play a quite good synergistic effect, wherein the weight ratio of the Trifloxystrobin to the Difenoconazole is (1-10):(1-10).

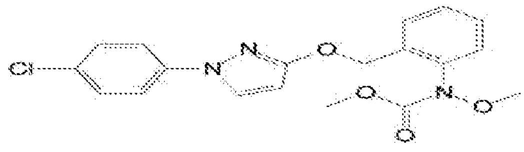
Reference may be made to Chinese patent no. CN102067881, a novel formulation of a pesticide bactericide composition, and particularly relates to a difenoconazole and Sulphur compounded suspending agent and a preparation method thereof. 5 to 30 percent of difenoconazole and 10 to 30 percent of Sulphur, preferably 5 to 20 percent of difenoconazole and 10 to 20 percent of Sulphur are compounded.

Strobilurin fungicides are broad-spectrum with rapid and highly efficient fungicidal activities, cost effective and rapidly degrade during plant metabolism. Such fungicides provide long, lasting, weather, protected disease control having superior rainfastness capabilities.Strobilurin fungicides are effective in controlling variety of fungi and pests including control of Leptosphaerulina and Curvularia species.

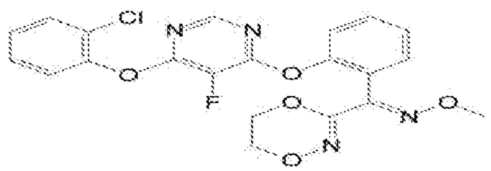
Various Strobilurin fungicides are known in the art. Chemical structure of some of such fungicides are provided below:



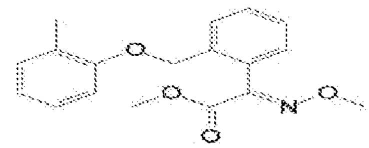
Azoxystrobin



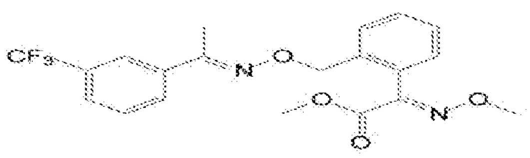
Pyraclostrobin



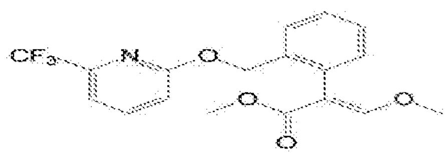
Fluoxastrobin



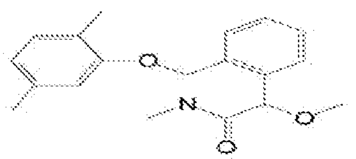
Kresoxim-methyl



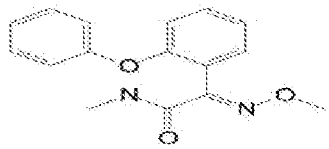
Trifloxystrobin



Picoxystrobin

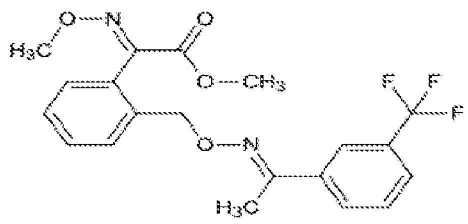


Mandestrobin



Metominostrobin

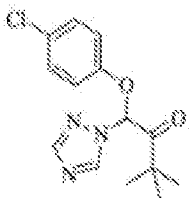
In particular, Trifloxystrobinhas IUPAC name: methyl (2E)-(methoxyimino)(2-{[({(1E)-1-[3-(trifluoromethyl)phenyl]ethylidene}amino)oxy]methyl}phenyl)acetate, CAS RN: 141517-21-7 belongs to Oximino- acetate class having target site code C-3 and is classified as QoI-(quinone Outside inhibition) fungicide. Trifloxystrobin is a widely used fungicide. It has a low aqueous solubility, a low volatility and, based on its chemical properties, would not normally be expected to leach to groundwater. It would not be expected to be persistent in soil or water systems. It has a low mammalian oral toxicity but there is some evidence that it may cause negative reproduction or fertility effects. It is highly toxic to bird, fish and aquatic invertebrates, but less toxic to honeybees and earthworms.



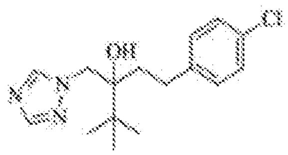
Structure of Trifloxystrobin

Triazole pesticide derivatives represent the most important category of fungicides that have excellent protective, curative and eradicant power towards a wide spectrum of crop infestations. The fungicide group, demethylation inhibitors (DMI), which contain the triazole fungicides, was introduced in the mid-1970s. These fungicides are highly effective against many different fungal diseases, especially powdery mildews, rusts, and many leaf-spotting fungi.

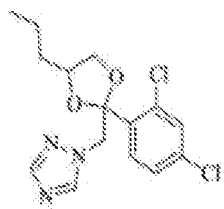
Various triazole fungicides are known in the art. Chemical structure of some of such fungicides are provided below:



triadimefon

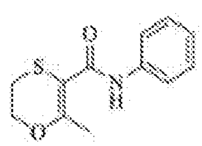


tebuconazole

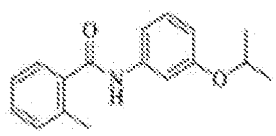


propiconazole

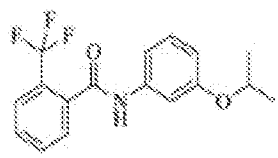
metconazole



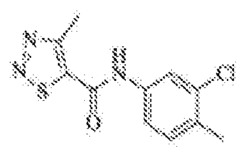
carboxin



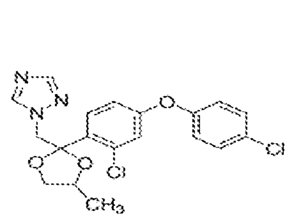
mepronil



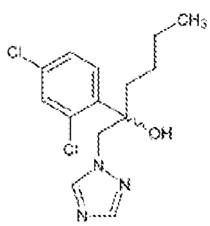
flutolanil



tiadinil

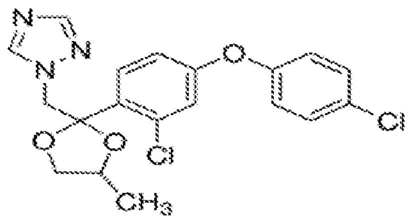


Difenoconazole



Hexaconazole

Difenoconazole: IUPAC name: 3-chloro-4-[(2RS,4RS;2RS,4SR)-4-methyl-2-(1H-1,2,4-triazol-1-ylmethyl)-1,3-dioxolan-2-yl]phenyl 4-chlorophenyl ether, CAS RN: 119446-68-3.Difenoconazole is a fungicide used for disease control in many fruits, vegetables, cereals and other field crops. Although potentially a mobile molecule it is unlikely to leach due to its low aqueous solubility. It does however have potential for particle bound transport. It is slightly volatile, persistent in soil and in the aquatic environment. There are some concerns regarding its potential for bioaccumulation. Moderately toxic to humans, mammals, birds and most aquatic organisms.



Structure of Difenoconazole

Above mentioned fungicides can be formulated into a variety of different forms preferably into liquid and solid compositions.

The present invention provides a novel method of preparing compositions comprising above mentioned active ingredients which are stable as well as provide desired bio-efficacy. Embodiments of the present invention may therefore ameliorate one or more of the above-mentioned problems.

OBJECTS AND ADVANTAGES OF THE INVENTION:

It is an object of the present invention to provide a novel and synergistic fungicidal composition demonstrating high efficacy and high selectivity.

It is another object of the present invention to provide a novel and effective fungicidal composition for controlling the harmful pests and fungi in plants.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which can be easily formulated.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which is ideal for fungicide resistance management.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which provides improved rainfastness.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which uses lesser amounts of the actives as compared to the actives when used alone.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which comprises combination of fungicides along with a performance enhancing adjuvant/catalyst.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which is environmentally safe, possesses broad spectrum bio-efficacy, is less toxic in terms of phytotoxicity to plants and dermal and inhalational toxicity to humans.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which has reduced dermal and inhalational toxicity to humans.

It is another object of the present invention to provide a novel and effective synergistic fungicidal composition which has increased shelf life and stability.

It is another object of the present invention to provide a novel and effective fungicidal composition which has increased uptake of active ingredients.

Yet another object of the present invention is to provide a method of controlling fungi using fungicidal composition comprising atleast one strobilurin fungicide and atleast one triazole fungicide and sub- fungicidal active amount of Sulphur, wherein sulphur is acting as a performance enhancer/catalyst.

It is another object of the present invention to provide a novel and effective fungicidal composition which has enhanced spreading and penetration of the active fungicidal components

It is another object of the present invention to provide a novel and effective fungicidal composition which is stable, non- toxic and has enhancedactive penetration properties with respective to the fungicidal actives.

It is another object of the present invention to provide a novel and effective fungicidal composition which has superior absorption, penetration, rainfastness and spreading properties which render the formulation as most efficacious and a superior fungicidal formulation.

It is still another object of the present invention to provide a composition comprising atleast one strobilurin fungicide, atleast one triazole fungicide and reduced amount of Sulphur along with bio based efficacy enhancing agents/adjuvants.

SUMMARY OF THE INVENTION

The present invention relates to a pesticidal composition comprising synergistic and bio-effective amount of atleast one strobilurin fungicide; atleast one triazole fungicide; and sub- fungicidal active amount of Sulphur, wherein sulphur acts as a performance enhancer/catalyst.

In another embodiment of the present invention, the fungicidal composition comprising effective amount of atleast one strobilurin fungicide selected from Azoxystrobin, Pyraclostrobin, Fluoxastrobin, Trifloxystrobin, Kresoxim-methyl and Picoxystrobin; atleast one triazole fungicide selected from Hexaconazole, Cyproconazole, Diclobutrazol, Difenoconazole, Diniconazole, Epoxiconazole, Etaconazole, Fenbuconazole, Propiconazole, Prothioconazole, Tebuconazole, Tetraconazole and Triticonazole; and reduced amount of Sulphurare present in synergistically effective weight ratio.

In another embodiment of the present invention, the fungicidal composition comprises effective amount of atleast one strobilurin fungicide selected from Azoxystrobin, Pyraclostrobin, Fluoxastrobin, Trifloxystrobin, Kresoxim-methyl and Picoxystrobin in the range 5 to 50 wt%; atleast one triazole fungicide selected from Hexaconazole, Cyproconazole, Diclobutrazol, Difenoconazole, Diniconazole, Epoxiconazole, Etaconazole, Fenbuconazole, Propiconazole, Prothioconazole, Tebuconazole, Tetraconazole and Triticonazole in the range 5 to 70 wt%; and Sulphur in the range of 1-7 wt%.

In another embodiment of the present invention, the fungicidal composition comprises sulphur present in an amount below its pesticidal active dose.

In another embodiment of the present invention, the fungicidal composition comprises effective amount of at least one strobilurin fungicide selected from Azoxystrobin, Pyraclostrobin, Fluoxastrobin, Trifloxystrobin, Kresoxim-methyl and Picoxystrobin in the range 5 to 50 wt%; at least one triazole fungicide selected from Hexaconazole, Cyproconazole, Diclobutrazol, Difenoconazole, Diniconazole, Epoxiconazole, Etaconazole, Fenbuconazole, Propiconazole, Prothioconazole, Tebuconazole, Tetraconazole and Triticonazole in the range 5 to 70 wt%; and Sulphur in the range of 1-7 wt%, which uses organosilicone surfactants (such as Silicone Ethoxylated Oil) as spreading and sticking agents and bio based efficacy enhancing agents.

In another embodiment of the present invention, the invention provides a method for effective control of various fungi in plants.

In another embodiment of the present invention, the fungicidal composition of the present invention further comprises an agrochemically acceptable excipients selected from the group consisting of anti-freezing agent, dispersing agents, wetting agents, antifoaming agents, biocides, thickeners, surfactants, preservatives, colorants, pigments, buffers, solvents, and the like. Additional components may also be included, e.g., protective colloids, adhesives, thickeners, thixotropic agents, penetration agents, stabilisers, sequestering agents. More generally, the active materials can be combined with any solid or liquid additive, formulation aids which complies with usual formulation techniques.

In another embodiment of the present invention, the fungicidal composition of the present invention further comprises organosilicone surfactants/adjuvant as spreading and sticking agents and bio based efficacy enhancing agents.

In another embodiment of the present invention, the fungicidal composition of the present invention further comprises trisiloxane ethoxylate as organosilicone surfactant/adjuvant.

In another embodiment of the present invention, the fungicidal composition of the present invention further comprises blend of polyterpene resin (natural oils) as bio based efficacy enhancing agents.

In yet another embodiment of the present invention, the fungicidal composition is formulated as capsule suspension (CS), Dispersible concentrate (DC), Dustable powder (DP), Powder for dry seed treatment (DS), Emulsifiable concentrate (EC), Emulsifiable granule (EG) Emulsifiable water-in-oil (EO), Emulsifiable powder (EP), Emulsifiable for seed treatment (ES), Emulsifiable oil-in-water (EW), flowable concentrate for seed treatment (FS), Suspension Concentrate (SC), Suspo-emulsion (SE), Water dispersible powder for slurry seed treatment (WS), Water dispersible granules (WDG) and Wettable powders (WP), a mixed formulation of CS and SC (ZC), soluble liquid (SL).

In yet another embodiment of the present invention, the invention further provides the process for preparation of the said formulation wherein, the said formulation can be one or more of capsule suspension (CS), Dispersible concentrate (DC), Dustable powder (DP), Powder for dry seed treatment (DS), Emulsifiable concentrate (EC), Emulsifiable granule (EG) Emulsifiable water-in-oil (EO), Emulsifiable powder (EP), Emulsifiable for seed treatment (ES), Emulsifiable oil-in-water (EW), flowable concentrate for seed treatment (FS), Suspension Concentrate (SC), Suspo-emulsion (SE), Water dispersible powder for slurry seed treatment (WS), Water dispersible granules (WDG) and Wettable powders (WP), a mixed formulation of CS and SC (ZC), soluble liquid (SL).

DETAILED DESCRIPTION OF THE INVENTION

Discussed below are some representative embodiments of the present invention. The invention in its broader aspects is not limited to the specific details and representative methods. The illustrative examples are described in this section in connection with the embodiments and methods provided. The invention according to its various aspects is particularly pointed out and distinctly claimed in the appended claims read in view of this specification and appropriate equivalents.

It is to be noted that, as used in the specification and the appended claims, the singular forms "a", "an" and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to a composition containing “a compound” includes a mixture of two or more compounds. It should also be noted that the term “or” is generally employed in its sense including “and/or” unless the content clearly dictates otherwise.

The expression of various quantities in terms of “% w/w” or “%” means the percentage by weight, relative to the weight of the total solution or composition unless otherwise specified.

The term “active ingredient” (a.i.) or “active agent” used herein refers to that component of the composition responsible for control of insects-pests or disease.

"Bioactive amounts” as mentioned herein means that amount which, when applied treatment of crops, is sufficient to effect such treatment. The bioactive amount of the compositions will also vary according to the prevailing conditions such as desired pesticidal effect and duration, weather, target species, locus, mode of application, and the like.

As used herein, the term "effective amount" means the amount of the active substances in the

As used herein, the term “sub-fungicidal amount” means the amount which is reduced or is present in a small proportion i.e. below the recommended dose on which catalytic and performance enhancing agent effect is seen when combined with other active(s).

In accordance with an embodiment of the invention, there is provided a synergistic pesticidal composition comprising active ingredients present in the weight ratios as given below; and one or more customary formulation adjuvants.

Strobilurin Fungicide	Triazole Fungicide	Catalyst/Performance enhancing agent
Azoxystrobin Pyraclostrobin Fluoxastrobin Trifloxystrobin Picoxystrobin Kresoxim methyl	Hexaconazole Cyproconazole Diclobutrazol Difenoconazole Diniconazole Epoxiconazole Etaconazole Fenbuconazole Propiconazole Prothioconazole Tebuconazole Tetraconazole Triticonazole	Sulphur
5-50%	**5-70%**	**1-7%**

Surprisingly it has been found that by combining the fungicides of the present synergistic fungicidal composition with reduced amount of sulphur in the sub-fungicidal range in a specified proportion, the dose per hectare (ha) is reduced and that there is longer duration of pest control with enhanced fungicidal control effect and reduced phytotoxicity with enhanced shelf life/stability. Further, the present synergistic fungicidal composition also exhibits better pest control during wet season due to its effective rainfastness property.

In preferred embodiment of the present invention, Trifloxystrobin is in the rangefrom5-50% weight of the total composition.

In another preferred embodiment of the present invention, Trifloxystrobin is present in an amount of 20% weight of the total composition

In another preferred embodiment of the present invention, Difenoconazoleis in the range from 5-70% weight of the total composition.

In yet another preferred embodiment of the present invention, Difenoconazole is present in an amount of25% weight of the total composition.

In another embodiment of the present invention, Sulphur is in the range from 1-7% weight of the total composition.

In preferred embodiment of the present invention, Sulphur is present in an amount of 6% weight of the total composition.

In another embodiment of the present invention, the invention further provides the process for preparation of the said formulation wherein, the said formulation can be one or more of as Capsule suspension (CS), Dispersible concentrate (DC), Dustable powder (DP), Powder for dry seed treatment (DS), Emulsifiable concentrate (EC), Emulsifiable granule (EG) Emulsifiable water-in-oil (EO), Emulsifiable powder (EP), Emulsifiable for seed treatment (ES), Emulsifiable oil-in-water (EW), flowable concentrate for seed treatment (FS), Suspension Concentrate (SC), Suspo-emulsion, Water dispersible powder for slurry seed treatment (WS), Water dispersible granules (WDG) and Wettable powders (WP).

In preferred embodiment of the present invention, the formulation is Suspension Concentrate (SC), Suspo-emulsion (SE), Flowable Slurry (FS), Water dispersible granules (WDG), Granules (GR) and Wettable powders (WP).

In still more preferred embodiment of the present invention, the formulation is Water dispersible granules (WDG) and Suspension concentrate (SC).

In yet another embodiment of the present invention, the agrochemically acceptable excipients of the formulation are selected from the group consisting of anti-freezing agent, dispersing agents, wetting agents, antifoaming agents, biocides, thickeners, adjuvants and solvents. One or more inactive excipient is selected from including but not limited to dispersant, anti-freezing agent, anti-foam agent, wetting agent, suspension aid, anti-microbial agent, thickener, quick coating agent or sticking agents (also referred to as “stickers” or “binders”), spreading agents and buffering agent.

An adjuvant used in the present invention is any material that is added to an agrochemical formulation to enhance or modify the performance of the formulation. An adjuvant used in the present invention to make it a safer to ecological environmental, having low toxicity and having no phytotoxicity effects on any part of the plant.

Extender or sticker/sticking agent keeps pesticides active on a target for an extended period or on waxy foliage. Sticker allows pesticides to stay on a treated surface longer. Some stickers help to hold solid particles to a treated surfaces. This reduces the amount that washes off due to rain or irrigation. Others reduce evaporation and/or slow breakdown by sunlight.

Spreader allows a pesticide to form a uniform layer over a treated surface. Spreaders such as Silicone Ethoxylated Oil lowers the surface tension of spray solutions beyond that which is achievable with conventional non-ionic surfactants. In fact, it has the potential to provide adequate coverage in many low volume spray applications at rates between 0.025% and 0.1% . It decreases the surface tension of spray solutions to much lower values, in comparison to conventional adjuvants. This results in significantly enhanced spreading of spray solutions over the treated plant surfaces which carries tank mix products to morphologically complex and thus difficult-to-reach parts of the plant.

Advantages of organosilicone adjuvants (OSSA):

- Quick spreading and wetting
- Uniform droplet distribution
- Absorption on leaf and stem surfaces
- Known benefits: Increases pesticide efficacy

In yet another embodiment of the present invention, the agrochemically acceptable adjuvants-Silicone Ethoxylated Oil, Polyvinyl Pyrrolidon, Polyvinyl Alcohol, Blend of poly terpene resin, are present in the range of 0.1-10%

Surfactants that are used as dispersants have the ability to adsorb strongly onto a particle surface and provide a charged or stearic barrier to re-aggregation of particles. The most commonly used surfactants are anionic, non-ionic, or mixtures both the types. Tristyrylphenolethoxylate phosphate esters are also used. Nonionics such as alkylarylethylene oxide condensates and EO-PO block copolymers are sometimes combined with anionics as dispersants for suspension concentrates. In recent years, new types of very high molecular weight polymeric surfactants have been developed as dispersants. Examples of dispersants used herein include but not limited to sodium lignosulphonates, sodium naphthalene sulphonate formaldehyde condensates, Tristyrylphenol Ethoxylate Amine salt of phosphate tristyryl phenol ethylated, Acrylic Copolymer, Ethoxylated Tristryl phenol Sulphate, Naphthalene sulfonic acid, sodium salt condensate with formaldehyde, Ethoxylated oleyl cetyl alcohol, Polyalkelene glycol ether, EO-PO block copolymers, and graft copolymers or mixtures thereof

Anti-freezing agent as used herein can be selected from the group consisting of polyethylene glycols, methoxypolyethylene glycols, polypropylene glycols, polybutylene glycols, glycerin and ethylene glycol.

Water-based formulations often cause foam during mixing operations in production. In order to reduce the tendency of foaming; anti-foaming agents are often added either during the production stage or before filling into bottles. Generally, there are two types of anti-foaming agents, namely silicones and non-silicones. Silicones are usually aqueous emulsions of dimethyl polysiloxane while the nonsilicone anti-foam agents are water-insoluble oils, such as octanol and nonanol, or silica. In both cases, the function of the anti-foam agent is to displace the surfactant from the air-water interface.

A wetting agent is a substance that when added to a liquid increases the spreading or penetration power of the liquid by reducing the interfacial tension between the liquid and the surface on which it is spreading. Wetting agents are used for two main functions in agrochemical formulations: during processing and manufacture to increase the rate of wetting of powders in water to make concentrates for soluble liquids or suspension concentrates; and during mixing of a product with water in a spray tank or other vessel to reduce the wetting time of wettable powders and to improve the penetration of water into water-dispersible granules. Examples of wetting agents used in wettable powder, suspension concentrate, and water-dispersible granule formulations include but not are limited to Tristyrylphenol ethoxylate non-ionic emulsifier, mixture of non-ionic surfactants & Alkoxylated Alcohol/Block copolymer, sodium lauryl sulphate, sodium dioctylsulphosuccinate, alkyl phenol ethoxylates and aliphatic alcohol ethoxylates and the salts thereof.

Fillers/ suspension aid. A natural or synthetic, organic or inorganic material with which the active substance is combined in order to facilitate its application to the plant, to the seeds or to the soil. This carrier is hence generally inert, and it must be agriculturally acceptable, in particular to the plant being treated. The carrier may be solid (clays, natural or synthetic silicates, silica, resins, waxes, solid fertilizers, and the like or mixtures thereof) or liquid (water, alcohols, ketones, petroleum fractions, aromatic or paraffinic hydrocarbons, chlorinated hydrocarbons, liquefied gases, and the like or mixtures thereof).

The anti-bacterial agents are used to eliminate or reduce the effect of microorganisms. Examples of such agents include, but are not limited to propionic acid and its sodium salt; sorbic acid and its sodium or potassium salts; benzoic acid and its sodium salt; phydroxy benzoic acid sodium salt; methyl p-hydroxy benzoate; and biocide such as sodium benzoate, 1,2-benzisothiazoline-3-one, 2-

methyl-4-isothiazolin-3-one, 5-chloro-2-methyl-4-isothiazolin-3-one, potassium sorbate, parahydroxy benzoates or mixtures thereof.

Thickeners or gelling agents are used mainly in the formulation of suspension concentrates, emulsions and suspo-emulsions to modify the rheology or flow properties of the liquid and to prevent separation and settling of the dispersed particles or droplets. Thickening, gelling, and anti-settling agents generally fall into two categories, namely water-insoluble particulates and water-soluble polymers. It is possible to produce suspension concentrate formulations using clays and silicas. Examples of these types of materials, include, but are limited to, montmorillonite, bentonite, magnesium aluminum silicate, and attapulgite. Water soluble polysaccharides most commonly used as thickening-gelling agents are natural extracts of seaweeds, synthetic derivatives of cellulose or mixtures thereof. Examples of these types of materials include, but are not limited to, guar gum, locust bean gum, carrageenam, xanthan gum, alginates, methyl cellulose, sodium carboxymethyl cellulose (SCMC), hydroxyethyl cellulose (HEC) or mixtures thereof. Other types of anti-settling agents are based on modified starches, polyacrylates, polyvinyl alcohol and polyethylene oxide or mixtures.

Buffering agent as used herein is selected from group consisting of calcium hydroxyapatite, Potassium Dihydrogen Phosphate, Sodium Hydroxide, carbonated apatite, calcium carbonate, sodium bicarbonate, tricalcium phosphate, calcium phosphates, carbonated calcium phosphates, amine monomers, lactate dehydrogenase and magnesium hydroxide.

AltaHance 3S is a distilled tall oil based green adjuvant. It isa biobased sticker adjuvant that enhances the effectiveness of agrochemicals by increasing their rainfastness—even under challenging conditions, such as cold temperatures and hard water. AltaHance provides the ability to tune rainfastness based on your formulation needs, providing flexibility, ease of handling and formulation robustness for customers.

Altastick HG (a blend of polyterpene resin and emulsifier) is commonly used as a sticker adjuvant to improve rainfastness and retention of the particles on foliage.Altastik HG is a blend of terpene resin and surfactant. Altastick HG is ready to use and can be applied in combination with penetrants to improve efficacy of pesticides. Altastick HG is free of nonylphenol ethoxylate (NPE).

The solvent for the formulation of the present invention may include water, water soluble alcohols. The water-soluble alcohol which can be used in the present invention may be lower alcohols or water-soluble macromolecular alcohols. The term "lower alcohol", as used herein, represents an alcohol having 1-4 carbon atoms, such as methanol, ethanol, n-propanol, isopropanol, n-butanol, tert-butanol, etc.

Spray colourants/ dyes are used as crop protectants as it helps in identification of areas where product has previously been applied, and for health & safety precaution & awareness.

In yet another embodiment of the present invention, the adjuvants are bio based performance enhancing agents which promote sticking and spreading of the pesticidal composition and also improve rainfastness of the pesticide composition.

In yet another embodiment the adjuvants further consist of castor oil ethoxylates, polyterpene resin and emulsifier blend.

In one embodiment, the compositions according to the present invention acts synergistically to control fungi in various crops. In an especially preferred embodiment of the invention, the yield of the treated plant is increased.

In another preferred embodiment of the invention, the yield of the plants treated according to the method of the invention, is increased synergistically. According to the present invention, "increased yield" of a plant, in particular of an agricultural, silvicultural and/or horticultural plant means that the yield of a product of the respective plant is increased by a measurable amount over the yield of the same product of the plant produced under the same conditions, but without the application of the mixture according to the invention.

Increase in yield of treated plants (cereals, pulses, oilseeds, fiber crop, sugar crops, leafy vegetables, tuber crops, fruit crops, flowers, ornamentals etc.). Increase in yield means increased plant weight, increased plant height, increased biomass such as higher overall fresh weight (FW), increased number of flowers per plant, higher grain yield, more tillers or side shoots (branches), larger leaves, increased shoot growth, increased protein content, increased oil content, increased starch content, increased pigment content, Increase in yield due to protection against Insect-pest damage and fungal diseases, Increase in yield due to plant growth regulation, check vegetative growth and increase in reproductive parts of plant, Increase in yield due to more number of tillers, more branches and sub branches, more number of fruits, flowers, and grains size, Increase plant vigor, Increase tolerance to insect-pests and fungal damage, Increase tolerance to the weather stress, moisture stress and heat stress, Prevents lodging in susceptible plants (lodging due to biotic and abiotic factors, like heavy rains, winds, insects and diseases damage.

It has been observed by the inventors of the present invention that the present synergistic fungicidal composition comprising reduced amount of sulphur increases the uptake of Strobilurin and Triazole fungicides. The composition combats effectively against the fungal diseases of fruits, vegetables, cereals and oil seed crops. The compositions of this invention are useful as plant disease control agents. The present invention therefore further comprises a method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof to be protected, or to the plant seed or seedling to be protected, an effective amount of the fungicidal composition of the present invention.

The compositions of this invention provide control of diseases caused by a broadspectrum of fungal plant pathogens in the Basidiomycete, Ascomycete, Oomycete and Deuteromycete classes. They are effective in controlling a broad spectrum of plant diseases, particularly foliar pathogens of ornamental, vegetable, field, cereal, and fruit crops.

These pathogens include:

Oomycetes, including Phytophthora diseases such as Phytophthora infestans, Phytophthora megasperma, Phytophthora parasitica, Phytophthora cinnamoni, Phytophthora capsici; Pythium diseases such as Pythium aphani dermatum; and diseases in the Peronosporaceae family, Such as Plasmopara viticola, Peronospora sp.(including Peronospora tabacina and Peronospora parasitica), Pseudop eronospora sp.(including Pseudoperonospora cubensis), and Bremia lactucae;

Ascomycetes, including Alternaria diseases such as Alternaria Solani and Alternaria brasicae, Guignardia diseases such as Guignardia bidwel. Venturia diseases such as Venturia inaequalis, Septoria diseases such as Septoria nodorum and Septoria tritici; powdery mildew diseases such as Erysiphe sp.(including Erysiphe graminis and Erysiphe polygoni), Uncinula necatur, Sphaerotheca filigena, and Podosphaera leucotricha, Pseudocercosporella herpotrichoides, Botrytis diseases such as Botrytis cinerea, Monilinia fructicola, Sclerotinia diseases such as Sclerotinia sclerotiorum, Magnaporthe grisea, Phomopsis viti cola, Helminthosporium diseases such as Helminthosporium tritici repentis, Pyrenophora teres; anthracnose diseases such as Glomerella or Colletotrichum sp. (Such as Colletotrichum graminicola); and Gaeumannomyces graminis;

Basidiomycetes, including rust diseases caused by Puccinia sp. (such as Puccinia recondita, Puccinia striformis, Puccinia hordei, Puccinia graminis, and Puccinia arachidis); Hemileia vastatrix; and Phakopsora pachyrhizi;

Other pathogens including Rhizoctonia spp (such as Rhizoctonia solani); Fusarium diseases such as Fusarium roseum, Fusarium graminearum, Fusarium oxysporum, Verticilium dahliae, Sclerotium

rolfsi. Rynchosporium secalis, Cercosporidium personatum, Cercospora arachidicola and Cercospora beticola, and other genera and species closely related to these pathogens.
The composition of the present invention also provides control of diseases caused by a broadspectrum of fungal plant pathogens preventatively or curatively by applying an effective amount of the composition either pre-or post-infection.

Plant disease control is ordinarily accomplished by applying an effective amount of a synergistic composition of the present invention either pre-or post-infection, to the portion of the plant to be protected such as the roots, stems, foliage, fruit, seeds, tubers or bulbs, or to the media (soil or sand) in which the plants to be protected are growing. The composition can also be applied to the seed to protect the seed and seedling. Typically, the composition is applied in the form of a composition comprising at least one additional component selected from the group consisting of Surfactants, Solid diluents and liquid diluents.

The synergistic fungicidal composition of the present invention is very helpful to the farmers to protect crops from following fungal diseases:

Disease	**Disease causing organisim**
Powdery mildew	*Erysiphe graminis*
Septoria glume blotch	Septoria nodorum
Leaf rust	*Puccinia recondita*
Septoria leaf blotch	*Septoria tritici*
Early Blight	*Alternaria solani*

According to an embodiment of the present invention, there is provided a method for controlling various fungi affecting plants and crops, which comprises applying effective amounts of a fungicidal composition comprising at least one strobilurin fungicide in the range of 5 to 50 wt%; at least one triazole fungicide in the range of 5 to 70 wt%; and Sulphur in the range of 1-7 wt% along with agrochemically acceptable adjuvants including organosilicone surfactant as spreading agent and bio based efficacy enhancing agents.

Inventors of the present invention succeeded in providing stable and efficacious composition with extended shelf life and stability of the synergistic combination of atleast one strobilurin fungicide; and atleast one triazole fungicide with increased uptake of strobilurin and triazole fungicides with the aid of Sulphur acting as a performance enhancer agent/catalyst at a reduced amount i.e. in the sub-fungicidal active amount

In order that the present invention may be more readily understood, reference will now be made, by way of example, to the following description. It will be understood that the specification and examples are illustrative but not limitative of the present invention and that other embodiments within the spirit and scope of the invention will suggest themselves to those skilled in the art. Other embodiments can be practiced that are also within the scope of the present invention. The following illustrations of examples are intended to illustrate a stable synergistic fungicidal composition, but in no way limit the scope of the present invention.

Example 1:

A stable Suspension Concentrate (SC) of Trifloxystrobin, Difenoconazole and Sulphur according to the present invention was prepared as follows:

SC (Suspension Concentrate)						
Sr. No.	Component	Composition				
		1	2	3	4	5
1	Trifloxystrobin Technical	5	5	40	20	5
2	Difenoconazole Technical	5	30	5	10	15
3	Sulphur Technical	1	2	2	4	6
4	Acrylic Copolymer	3.00	3.00	3.00	3.00	3.00
5	Naphthalene sulfonic acid,sodium salt condensate with formaldehyde	4.00	4.00	4.00	4.00	4.00
6	Blend of Poly terpene Resin (natural oils)	1.00	1.00	1.00	1.00	1.00
7	Silicone Antifoam	0.50	0.50	0.50	0.50	0.50
8	Benzisothiazoline	0.10	0.10	0.10	0.10	0.10
9	Glycol	5.00	5.00	5.00	5.00	5.00
10	Polysaccharides	0.10	0.10	0.10	0.10	0.10
11	DM water	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Example 1:

Sr. No.	**Ingredients**	**Quantity % w/w**
1	Trifloxystrobin Technical	5-50%
2	Difenoconazole Technical	5-70%
3	Sulphur Technical	1-7%

4	Dispersing Agent- Tristyrylphenol Ethoxylate Amine salt of phosphate tristyryl phenol ethylated /Acrylic Copolymer/ Ethoxylated Tristryl phenol Sulphate,Naphthalene sulfonic acid,sodium salt condensate with formaldehyde,Ethoxylated oleyl cetyl alcohol, Polyalkelene glycol ether	0.5-10%
5	Wetting Agent- Tristyrylphenol ethoxylate nonionic emulsifier/ Mixture of non-ionic surfactants & Alkoxylated Alcohol/Block copolymer,	0.5-10%
6	Antifoaming Agent-Siloxane polyalkyleneoxide	0.01-1%
7	Antifreezing Agent- Glycol,Propylene Glycol,Mono ethylene glycol,Glycerin	0.1-10%
8	Adjuvants-Silicone Ethoxylated Oil, Polyvinyl Pyrrolidon, Poly vinyl Alcohol, Blend of poly terpene resin (natural oils)	0.1-10%
9	Filler- Silicon Dioxide/China -Clay/Kaolin/Talc/starch	0.1-5%
10	Anti-bacterial – Benzisothiazolin-3-one / Formaldehyde	0.01-1%
11	Polysaccharides/carboxymethyl cellulose/Bentonite Clay	0.01-3%
12	DM water	Q.s to make 100
	Total	100

Example 2:

Sr. No.	Ingredients	Quantity % w/w
1	Trifloxystrobin Technical	30.00%
2	Difenoconazole Technical	10.00%
3	Sulphur Technical	2%
4	Dispersing Agent- Tristyrylphenol Ethoxylate Amine salt of phosphate	3%
5	Wetting Agent- Block copolymer	2%
6	Antifoaming Agent-Siloxane polyalkyleneoxide	0.20%
7	Antifreezing Agent- Propylene Glycol	5%
8	Adjuvants-Blend of poly terpene resin (natural oils)	1%
9	Filler- China –Clay	1%
10	Anti-bacterial – Benzisothiazolin-3-one	0.10%
11	Polysaccharides	0.10%
12	DM water	Q.s to make

		100
	Total	100

Process: Required quantity of water, biocide, and defoamer followed by addition of gum powder are homogenized with stirring to obtain a gum solution (Gum Solution should be made 12-18 hour prior to use). Required quantity of DM water, wetting agent, dispersing agent & suspending agents, colourant/dye was added into the charged vessel followed by homogenization for a period of ranging between 45 – 60 minutes using high shear homogeniser to obtain a homogenized slurry. Technical and other remaining adjuvants excluding 'antifreeze & thickeners' were added into the homogenized slurry to obtain a uniform slurry. Half of the quantity of required antifoam agent was added into the slurry. The uniform slurry mixture was then passed through appropriate particle size reduction equipment (Dyno-Mill) until the granule material of the desired particle size was achieved. Remaining half of the quantity of required antifoam agent along with the antifreeze agent was added to the granule material as obtained. Gum solution as obtained in the first step was then added to obtain the suspension concentrate.

A stable Flowable Slurry (FS) of Trifloxystrobin, Difenoconazole and Sulphur according to the present invention was prepared as follows:

FS (Flowable Slurry)						
Sr. No.	Component	Composition				
		1	2	3	4	5
1	Trifloxystrobin Technical	5	5	25	20	5
2	Difenoconazole Technical	5	25	15	5	20
3	Sulphur Technical	1	2	3	5	6
4	Acrylic Copolymer	3.00	3.00	3.00	3.00	3.00
5	Naphthalene sulfonic acid,sodium salt condensate with formaldehyde	4.00	4.00	4.00	4.00	4.00
6	Blend of poly terpene resin (natural oils)	1.00	1.00	1.00	1.00	1.00
7	Silicone Antifoam	0.50	0.50	0.50	0.50	0.50
8	Benzisothiazoline	0.10	0.10	0.10	0.10	0.10
9	Glycol	5.00	5.00	5.00	5.00	5.00
10	Polysaccharides	0.10	0.10	0.10	0.10	0.10
11	DM water	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Example 3:

Sr. No.	Ingredients	Quantity % w/w
1	Trifloxystrobin Technical	15.00%
2	Difenoconazole Technical	15.00%
3	Sulphur Technical	2%
4	Dispersing Agent- Tristyrylphenol Ethoxylate Amine salt of phosphate	3%
5	Wetting Agent- Block copolymer	2%
6	Antifoaming Agent-Siloxane polyalkyleneoxide	0.20%
7	Antifreezing Agent- Propylene Glycol	5%
8	Filler- China –Clay	1%
9	Anti-bacterial – Benzisothiazolin-3-one	0.10%
10	Adjuvants-Blend of poly terpene resin (natural oils)	1%
11	Polysaccharides	0.10%
12	DM water	Q.s to make 100
	Total	100

Process: Required quantity of water, biocide, and defoamer followed by addition of gum powder are homogenized with stirring to obtain a gum solution (Gum Solution should be made 12-18 hour prior to use). Required quantity of DM water, wetting agent, dispersing agent & suspending agents, colourant/dye was added into the charged vessel followed by homogenization for a period of ranging between 45 – 60 minutes using high shear homogeniser to obtain a homogenized slurry. Technical and other remaining adjuvants excluding ‘antifreeze & thickeners’ were added into the homogenized slurry to obtain a uniform slurry. Half of the quantity of required antifoam agent was added into the slurry. The uniform slurry mixture was then passed through appropriate particle size reduction equipment (Dyno-Mill) until the granule material of the desired particle size was achieved. Remaining half of the quantity of required antifoam agent along with the antifreeze agent was added to the granule material as obtained. Gum solution as obtained in the first step was then added to obtain the flowable slurry.

A stable Granule formulation (GR) of Trifloxystrobin, Difenoconazole and Sulphur according to the present invention was prepared as follows:

GR (Granule)						
Sr. No.	Component	Composition				
		1	2	3	4	5

1	Trifloxystrobin Technical	10	5	5	15	10
2	Difenoconazole Technical	5	10	5	5	5
3	Sulphur Technical	2	5	6	3	7
4	Sodium Polycarboxylate	3.00	3.00	3.00	3.00	3.00
5	Sodium Lauryl Sulfate	4.00	4.00	4.00	4.00	4.00
6	Pigment blue	0.10	0.10	0.10	0.10	0.10
7	Blend of poly terpene resin(natural oils)	0.50	0.50	0.50	0.50	0.50
9	China Clay	5.00	5.00	5.00	5.00	5.00
10	DM water	1.00	2.00	1.00	2.00	1.00
11	Sand	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Example 4:

Sr. No.	Ingredients	Quantity % w/w
1	Trifloxystrobin Technical	5.00%
2	Difenoconazole Technical	5.00%
3	Sulphur Technical	5.00%
4	Dispersing Agent- Calcium Ligno sulphate	3%
5	Pigment Blue	0.20%
6	Filler- China –Clay	5%
7	Sticking agent/Adjuvants- Blend of poly terpene resin(natural oils)/Polyvinyl pyrolliddone	0.10%
8	DM water	1%
9	Sand	Q.s to make 100
	Total	100

Process: Required quantity of filler, wetting agent, dispersing agent, and suspending agent, & technical was mixed in a premixing blender for homogenization for a period of 30 minutes to obtain a pre-blended material. The pre-blended material as obtained in the first step was blended through Jet mill/ air classifier mills followed by blending in post blender for a period of ~1.5 hour to obtain a homogeneous mixture. Then required quantity of sand was charged in the granulator, later DM water,sticking agent and remaining material was added till it became homogeneous. The finely grinded material was then completely coated on sand and the resulting formulation was blended for 30 minutes to obtain the granule formulation.

A stable Water Dispersible Granule formulation (WDG) of Trifloxystrobin, Difenoconazole and Sulphur according to the present invention was prepared as follows:

WG (Water Dispersible Granule)						
Sr. No.	Component	Composition				
		1	2	3	4	5
1	Trifloxystrobin Technical	20	20	20	20	20
2	Difenoconazole Technical	25	25	25	25	25
3	Sulphur Technical	0	2	4	6	7
4	Sodium Polycarboxylate	8.00	11.00	10.00	1.00	10.00
5	Sodium Lauryl Sulfate	6.00	7.00	4.00	5.00	4.00
6	Sodium ligno sulfonate	2.00	1.00	1.00	1.00	1.00
7	Sodium alkylnaphthalenesulfonate, formaldehyde condensate	0.50	0.50	0.50	0.50	0.50
8	Silicone based antifoam	0.10	0.10	0.10	0.10	0.10
9	Blend of poly terpene resin(natural oils)	0.10	0.10	0.10	0.10	0.10
10	Precipitated Silica	0.10	0.10	0.10	0.10	0.10
11	China Clay	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Example 5:

WG (Water Dispersible Granule)		
Sr. No.	**Ingredients**	**Quantity % w/w**
1	Trifloxystrobin Technical	50.00%
2	Difenoconazole Technical	10.00%
3	Sulphur Technical	6.00%
5	Dispersing Agent-Sodium Polycarboxylate	3.00
6	Wetting Agent-Sodium Lauryl Sulfate	4.00
7	Dispersing agent: Sodium alkyl naphthalene sulfonate blend	1.00
8	Adjuvants- Blend of poly terpene resin(natural oils)Polyvinyl pyrolliddone	0.10
9	Antifoam-Polydimethyl Siloxane	0.10

10	Filler-China Clay	QS to Make 100

Process: Required quantity of filler, wetting agent, dispersing agent, and suspending agent, adjuvants& technical was mixed in a premixing blender for homogenization for a period of 30 minutes to obtain a pre-blended material. The pre-blended material as obtained in the first step was blended through Jet mill/ air classifier mills followed by blending in post blender for a period of ~1.5 hour to obtain a homogeneous mixture. Required quantity of water (qs) was then added to make a dough. The dough was then passed through the extruder to obtain granules of required size. Wet granules as obtained were passed through the fluidised bed drier followed by grading using vibrating screens to obtain the wettable granules.

A stable Wettable Powder formulation (WP) of Trifloxystrobin, Difenoconazole and Sulphur according to the present invention was prepared as follows:

WP (Wettable Powder)						
Sr. No.	Component	Composition				
		1	2	3	4	5
1	Trifloxystrobin Technical	5	50	5	30	20
2	Difenoconazole Technical	5	15	70	30	25
3	Sulphur Technical	1	3	5	6	2
4	Sodium Polycarboxylate	8.00	8.00	8.00	8.00	8.00
5	Sodium Lauryl Sulfate	5.00	5.00	5.00	5.00	5.00
6	Blend of poly terpene resin(natural oils)	1.00	1.00	1.00	1.00	1.00
7	Sodium alkylnaphthalenesulfonate, formaldehyde condensate	0.50	0.50	0.50	0.50	0.50
8	Silicone based antifoam	0.10	0.10	0.10	0.10	0.10
9	Starch	5.00	5.00	5.00	5.00	5.00
10	Precipitated Silica	0.10	0.10	0.10	0.10	0.10
11	China Clay	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Example 6:

Sr. No.	**Ingredients**	**Quantity % w/w**

1	Trifloxystrobin Technical	40.00%
2	Difenoconazole Technical	5.00%
3	Sulphur Technical	6.00%
4	Dispersing Agent-Sodium ligno sulfonate	3.00%
5	Wetting Agent-Sodium Lauryl Sulfate	4.00%
6	Dispersing agent-Sodium alkyl naphthalene sulfonate blend	1.00%
7	Adjuvants-Polyvinyl pyrolliddone/ Blend of poly terpene resin(natural oils)	1.00%
8	Antifoam-Polydimethyl Siloxane	0.10%
9	Filler-China Clay	QS to Make 100

Process: Required quantity of filler, wetting agent, dispersing agent, and suspending agent, & technical were charged in premixing blender for homogenization for a period of 30 minutes to obtain a pre-blended material. The pre-blended material was grinded through Jet mill/ air classifier mills followed by blending in post blender for a period of ~1.5 hr to obtain a homogeneous material. The homogenous material as obtained was unloaded and analysed.

A stable Suspo-emulsion formulation (SE) of Trifloxystrobin, Difenoconazole and Sulphur according to the present invention was prepared as follows:

SE (Suspo Emulsion)						
Sr. No.	Component	Composition				
		1	2	3	4	5
1	Trifloxystrobin Technical	5	5	25	20	5
2	Difenoconazole Technical	5	25	15	5	20
3	Sulphur Technical	1	2	4	5	6
4	Acrylic Copolymer	3.00	3.00	3.00	3.00	3.00
5	Naphthalene sulfonic acid,sodium salt condensate with formaldehyde	4.00	4.00	4.00	4.00	4.00
6	Blend of poly terpene resin (natural oils)	1.00	1.00	1.00	1.00	1.00
7	Silicone Antifoam	0.50	0.50	0.50	0.50	0.50
8	Benzisothiazoline	0.10	0.10	0.10	0.10	0.10
9	Glycol	5.00	5.00	5.00	5.00	5.00
10	1-Octanol	15.00	20.00	20.00	15.00	15.00
11	Polysaccharides	0.10	0.10	0.10	0.10	0.10
12	DM water	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Example 7:

Suspo Emulsion(SE)		
Sr. No.	**Ingredients**	**Quantity % w/w**
1	Trifloxystrobin Technical	15.00%
2	Difenoconazole Technical	15.00%
3	Sulphur Technical	2.00%
4	Dispersing Agent- Tristyrylphenol Ethoxylate Amine salt of phosphate	3%
5	Wetting Agent- Block copolymer,	2%
6	Antifoaming Agent-Siloxane polyalkyleneoxide	0.20%
7	Antifreezing Agent- Propylene Glycol	5%
8	1-octanol	10%
9	Anti-bacterial – Benzisothiazolin-3-one	0.10%
10	Adjuvants-Blend of poly terpene resin (natural oils)	1%
11	Polysaccharides	0.10%
12	DM water	Q.s to make 100
	Total	100

Process: Required quantity of water, biocide, and defoamer followed by addition of gum powder are homogenized with stirring to obtain a gum solution (Gum Solution should be made 12-18 hour prior to use). Required quantity of DM water is charged, wetting agent, dispersing agent & suspending agents, colorant/dye was added into the charged vessel followed by homogenization for a period of ranging between 45 – 60 minutes using high shear homogeniser to obtain a homogenized slurry. Technical and other remaining adjuvants excluding ‘antifreeze & thickeners’ were added into the homogenized slurry to obtain a uniform slurry. Half of the quantity of required antifoam agent was added into the slurry. The uniform slurry mixture was then passed through appropriate particle size reduction equipment (Dyno-Mill) until the granule material of the desired particle size was achieved. Remaining half of the quantity of required antifoam agent along with the antifreeze agent was added to the granule material as obtained. Gum solution as obtained in the first step was then added to obtain the suspo-emulsion.

Biological Examples:

Example 8: Bio-efficacy studies

Bio-efficacy of the fungicidal composition of the present invention:

The synergistic effect and efficacy of fungicidal action of the inventive composition can be demonstrated by the experiments below. A synergistic effect exists wherever the action of a combination of active ingredients/components is greater than the sum of the action of each of the active ingredients/components taken alone. Therefore, a synergistically effective amount or an effective amount of a synergistic composition or combination is an amount that exhibits greater pesticide activity than the sum of the pesticide activities of the individual components. In the field of agriculture, it is often understood that the term "synergy" is as defined by Colby S.R. in an article entitled "Calculation of the synergistic and antagonistic responses of herbicide combinations" published in the journal Weeds, 1967, 15, p.20-22, incorporated herein by reference in its

entirety. The action expected for a given combination of two active components can be calculated as follows:

Colby's Formula:

$$E = X + Y + Z - \left\{ \frac{XY + YZ + XZ}{100} \right\} + \left(\frac{X\ Y\ Z}{10000} \right)$$

Where E = Expected % control by mixture of three products A, B and C in a defined dose
X = Observed % control by product A
Y = Observed % control by product B
Z = Observed % control by product C

$$\text{Ratio} = \frac{\text{Observed Control \%}}{\text{Expected Control \%}}$$

Ratio of O/E > 1, means synergism observed.

Evaluation of the synergistic fungicidal effect of the present composition can be established by using any synergistic fungicidal composition prepared by the process described in the above examples. For these evaluations one or more of the synergistic fungicidal compositions prepared in the examples are used here.

Table 1

Second active Compound	**Dose Rate**	**First active compound - <u>Trifloxystrobin</u>**	**Third active Compound**	**Dose Rate**
	g a.i./ha	**Dose Rate (g a.i./ha)**		**g a.i./ha**

Difenoconazole	0	0	35		50	65	80	95.00	**Sulphur**	0
	25	0	35		50	65	80	95.00		5
	37.5	0	35		50	65	80	95.00		10
	50	0	35		50	65	80	95.00		15
	62.5	0	35		50	65	80	95.00		30
	75	0	35		50	65	80	95.00		150

BIO-EFFICACY- Experimentation details and studies

Laboratory screening of various formulations given in Table 1 and examples above, were carried out to evaluate their efficacy against various fungi causing fungal diseases in crop plants. The synergistic effect on growth of the pathogen in vitro as polyhouse (with temperature and humidity regulated facilities) study were studied.

Results of Bio-efficacy tests comprising of Experiments below, a rating of 100 indicates 100% disease control and a rating of o indicates no disease control (relative to control). Columns labelled Avg. Observed % disease control indicates average of three replications. Columns labelled Expected indicate the expected value for each treatment mixture using the Colby equation. Treatments showing substantially greater control than expected are labelled with *

Test Crop	**Wheat**	**Variety: HD 2967**
Efficacy tested against following diseases:		

Disease name	**Causal organism**
Powdery mildew	*Erysiphe graminis*
Septoria glume blotch	Septoria nodorum
Leaf rust	*Puccinia recondite*
Septoria leaf blotch	*Septoria tritici*

Study 1

Target disease :	**Powdery mildew**	**Erysiphe graminis (causal organism)**

Experiment-1. Wheat seedlings were inoculated with a spore dust of Erysiphe graminis f.sp.tritici, (the causal organism of wheat powdery mildew) and incubated in a growth chamber at 20° C. for 48h prior to application. The test suspensions were then sprayed to thepoint of run-off on the wheat seedlings. The following day the seedlings were moved to a growth chamber at 20°C. for 5days, after which disease ratings were made.

Experiment-2. The test suspensions were sprayed to the point of run-of on wheat seedlings. The following day the seedlings were inoculated with aspore dust of Erysiphe graminis f.sp. tritici, (the causal organism of wheat powdery mildew) and incubated in a growth chamber at 20°C.for 7days, after which disease ratings were taken.

Experiment-3. The test suspensions were sprayed to the point of run-of on wheat seedlings. Five days later, the seedlings were inoculated with aspore dust of Erysiphe graminis f.sp. tritici, (the causal agent of wheat powdery mildew) and incubated in a growth chamber at 20°C. for 7days, after which disease ratings were taken.

<u>Treatment Details</u>

Table 2

Sr. No.	Treatment Details	% of Active present per 250gm of formulation
1.	**T_1**	Trifloxystrobin 14% (Solo)
2.	**T_2**	Trifloxystrobin 20% (Solo)
3.	**T_3**	Trifloxystrobin 26% (Solo)
4.	**T_4**	Trifloxystrobin 38% (Solo)
5.	**T_5**	Difenoconazole 10% (Solo)
6.	**T_6**	Difenoconazole 20% (Solo)
7.	**T_7**	Difenoconazole 25% (Solo)
8.	**T_8**	Difenoconazole 30% (Solo)
9.	**T_9**	Sulphur 2% (Solo)
10.	**T_{10}**	Sulphur 3% (Solo)
11.	**T_{11}**	Sulphur 4% (Solo)
12.	**T_{12}**	Sulphur 6% (Solo)
13.	**T_{13}**	Sulphur 60% (Solo)
14.	**T_{14}**	Trifloxystrobin 20% + Difenoconazole 25%
15.	**T_{15}**	Trifloxystrobin 14% + Difenoconazole 10% + Sulphur 2%
16.	**T_{16}**	Trifloxystrobin 14% + Difenoconazole 20% + Sulphur 4%
17.	**T_{17}**	Trifloxystrobin 14% + Difenoconazole 25% + Sulphur 6%

18.	**T_{18}**	Trifloxystrobin 14% + Difenoconazole 30% + Sulphur 60%
19.	**T_{19}**	Trifloxystrobin 20% + Difenoconazole 10% + Sulphur 2%
20.	**T_{20}**	Trifloxystrobin 20% + Difenoconazole 20% + Sulphur 4%
21.	**T_{21}**	Trifloxystrobin 20% + Difenoconazole 25% + Sulphur 6%
22.	**T_{22}**	Trifloxystrobin 20% + Difenoconazole 30% + Sulphur 60%
23.	**T_{23}**	Trifloxystrobin 20% + Difenoconazole 25% + Sulphur 3%
24.	**T_{24}**	Trifloxystrobin 26% + Difenoconazole 10% + Sulphur 2%
25.	**T_{25}**	Trifloxystrobin 26% + Difenoconazole 20% + Sulphur 4%
26.	**T_{26}**	Trifloxystrobin 26% + Difenoconazole 25% + Sulphur 6%
27.	**T_{27}**	Trifloxystrobin 26% + Difenoconazole 30% + Sulphur 60%
28.	**T_{28}**	Trifloxystrobin 38% + Difenoconazole 10% + Sulphur 2%
29.	**T_{29}**	Trifloxystrobin 38% + Difenoconazole 20% + Sulphur 4%
30.	**T_{30}**	Trifloxystrobin 38% + Difenoconazole 25% + Sulphur 6%
31.	**T_{31}**	Trifloxystrobin 38% + Difenoconazole 30% + Sulphur 60%

Experiment 1

Table 3

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease control %**	**Expected Disease control %**	**Difference**
	g a.i/ha					
T_1	35	0	0	41.30	-	
T_2	50	0	0	75.60		
T_3	65	0	0	94.00	-	
T_4	95	0	0	100.00	-	
T_5	0	25	0	30.30		
T_6	0	50	0	55.60	-	
T_7	0	62.5	0	76.00	-	
T_8	0	75	0	89.60	-	
T_9	0	0	5	14.30		
T_{10}	0	0	7.5	19.00	-	
T_{11}	0	0	10	20.60	-	
T_{12}	0	0	15	25.50	-	
T_{13}	0	0	150	35.50	-	
T_{14}	50	62.5	0	88.00	89.17	-1.17

T_{15}	35	25	5	60.00	64.94	-4.94
T_{16}	35	50	10	78.30	79.31	-1.01
T_{17}	35	62.5	15	87.10	89.50	-2.40
T_{18}	35	75	150	95.60	96.06	-0.46
T_{19}	**50**	25	5	67.30	85.43	-18.13
T_{20}	**50**	50	10	94.10	91.40	2.70
T_{21}	**50**	**62.5**	**15**	**100.00**	**95.64**	**4.36**
T_{22}	**50**	75	150	100.00	98.36	1.64
T_{23}	50	62.5	7.5	94.00	95.26	-1.26
T_{24}	65	25	5	79.90	96.42	-16.52
T_{25}	65	50	10	94.00	97.88	-3.88
T_{26}	65	62.5	15	100.00	98.93	1.07
T_{27}	65	75	150	100.00	99.60	0.40
T_{28}	95	25	5	100.00	100.00	0.00
T_{29}	95	50	10	100.00	100.00	0.00
T_{30}	95	62.5	15	100.00	100.00	0.00
T_{31}	95	75	150	100.00	100.00	0.00

Experiment 2

Table 4

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease control %**	**Expected Disease control %**	**Difference**
	g a.i/ha					
T_1	35	0	0	49.00	-	
T_2	50	0	0	70.00		
T_3	65	0	0	88.60	-	
T_4	95	0	0	100.00	-	
T_5	0	25	0	32.00		
T_6	0	50	0	50.30	-	
T_7	0	62.5	0	68.60	-	

T_8	0	75	0	82.60	-	
T_9	0	0	5	0.00		
T_{10}	0	0	7.5	0.00	-	
T_{11}	0	0	10	0.00	-	
T_{12}	0	0	15	4.60	-	
T_{13}	0	0	150	6.60	-	
T_{14}	50	62.5	0	83.66	90.58	-6.92
T_{15}	35	25	5	61.00	65.32	-4.32
T_{16}	35	50	10	70.00	74.65	-4.65
T_{17}	35	62.5	15	85.00	84.72	0.28
T_{18}	35	75	150	93.00	91.71	1.29
T_{19}	**50**	25	5	77.30	79.60	-2.30
T_{20}	**50**	50	10	88.00	**85.09**	**2.91**
T_{21}	**50**	**62.5**	**15**	**94.00**	**91.01**	**2.99**
T_{22}	**50**	75	150	96.00	95.12	0.88
T_{23}	50	62.5	7.5	88.00	90.52	-2.58
T_{24}	65	25	5	90.00	92.25	-2.25
T_{25}	65	50	10	95.00	94.33	0.67
T_{26}	65	62.5	15	97.00	96.59	0.41
T_{27}	65	75	150	98.00	98.15	-0.15
T_{28}	95	25	5	99.30	100.00	-0.70
T_{29}	95	50	10	100.00	100.00	0.00
T_{30}	95	62.5	15	100.00	100.00	0.00
T_{31}	95	75	150	100.00	100.00	0.00

Experiment 3

Table 5

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease control %**	**Expected Disease control %**	**Difference**
	g a.i/ha					
T_1	35	0	0	39.00	-	
T_2	50	0	0	62.00		

T_3	65	0	0	66.00	-	
T_4	95	0	0	98.00	-	
T_5	0	25	0	27.00		
T_6	0	50	0	32.00	-	
T_7	0	62.5	0	44.00	-	
T_8	0	75	0	50.00	-	
T_9	0	0	5	0.00		
T_{10}	0	0	7.5	0.00	-	
T_{11}	0	0	10	0.00	-	
T_{12}	0	0	15	0.00	-	
T_{13}	0	0	150	2.66	-	
T_{14}	50	62.5	0	75.00	78.72	-3.72
T_{15}	35	25	5	53.66	55.47	-1.81
T_{16}	35	50	10	55.66	58.52	-2.86
T_{17}	35	62.5	15	64.00	65.84	-1.84
T_{18}	35	75	150	69.66	70.31	-0.65
T_{19}	**50**	25	5	66.30	72.26	-5.96
T_{20}	**50**	50	10	75.00	**74.16**	**0.84**
T_{21}	**50**	**62.5**	**15**	**83.00**	**78.72**	**4.28**
T_{22}	**50**	75	150	86.00	81.51	4.49
T_{23}	50	62.5	7.5	73.33	78.72	-5.39
T_{24}	65	25	5	69.30	75.18	-5.88
T_{25}	65	50	10	77.00	76.88	0.12
T_{26}	65	62.5	15	86.00	80.96	5.04
T_{27}	65	75	150	93.33	83.45	9.88
T_{28}	95	25	5	94.00	98.54	-4.54
T_{29}	95	50	10	100.00	98.64	1.36
T_{30}	95	62.5	15	100.00	98.88	1.12
T_{31}	95	75		100.00	99.03	0.97

<u>Study 2:</u>

Target disease	**Septoria glume blotch**	***Septoria nodorum (causal organism)***

Experiment 4: Wheat seedlings were inoculated with a spore Suspension of Septoria nodorum (the causal organism of Septoria glume blotch) and incubated in a saturated atmosphere at 20°C. for 48h. The test suspensions were then sprayed to the point of run-off on the wheat seedlings. The following day the seedlings were moved to a growth chamber at 20°C. for 7days,after which disease ratings were recorded.

Experiment 5: The test suspensions were sprayed to the point of run-of on wheat seedlings. The following day the seedlings were inoculated with a spore Suspension of Septoria nodorum (the causal organism of Septoria glume blotch) and incubated in a saturated atmosphere at 20°C. for 48h, and then moved to a growth chamber at 20°C. for 8days, after which disease ratings were recorded.

Experiment 6: The test suspensions were sprayed to the point of run-of on wheat seedlings. Five days later, the seedlings were inoculated with a spore suspension of Septoria nodorum (the causal organism of Septoria glume blotch) and incubated in a saturated atmosphere at 20°C. for 48h, and then moved to a growth chamber at 20°C. for 8days, after which disease ratings were recorded.

<u>Experiment 4</u>

Table 6

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease control %**	**Expected Disease control %**	**Difference**
	g a.i/ha					
T_1	35	0	0	0.00	-	
T_2	50	0	0	5.00		
T_3	65	0	0	10.00	-	
T_4	95	0	0	30.00	-	
T_5	0	25	0	13.00		
T_6	0	50	0	70.00	-	
T_7	0	62.5	0	85.00	-	
T_8	0	75	0	97.00	-	
T_9	0	0	5	0.00		
T_{10}	0	0	7.5	0.00	-	
T_{11}	0	0	10	0.00	-	
T_{12}	0	0	15	0.00	-	

T_{13}	0	0	150	5.00	-	
T_{14}	50	62.5	0	85.30	85.75	-0.45
T_{15}	35	25	5	13.00	13.00	0.00
T_{16}	35	50	10	55.00	70.00	-15.00
T_{17}	35	62.5	15	90.00	85.00	5.00
T_{18}	35	75	150	100.00	97.15	2.85
T_{19}	**50**	25	5	16.60	17.35	-0.75
T_{20}	**50**	50	10	66.00	**71.50**	**-5.50**
T_{21}	**50**	**62.5**	**15**	**93.33**	**85.75**	**7.58**
T_{22}	**50**	75	150	100.00	97.29	2.71
T_{23}	50	62.5	7.5	81.67	85.75	-4.08
T_{24}	65	25	5	18.00	21.70	-3.70
T_{25}	65	50	10	72.00	73.00	-1.00
T_{26}	65	62.5	15	92.00	86.50	5.50
T_{27}	65	75	150	100.00	97.44	2.57
T_{28}	95	25	5	37.30	39.10	-1.80
T_{29}	95	50	10	83.60	79.00	4.60
T_{30}	95	62.5	15	93.30	89.50	3.80
T_{31}	95	75	150	98.00	98.01	0.00

Experiment 5

Table 7

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease control %**	**Expected Disease control %**	**Difference**
	g a.i/ha					
T_1	35	0	0	0.00	-	
T_2	50	0	0	0.00		
T_3	65	0	0	5.00	-	
T_4	95	0	0	15.00	-	
T_5	0	25	0	18.00		

T_{6}	0	50	0	65.00	-	
T_{7}	0	62.5	0	91.00	-	
T_{8}	0	75	0	99.00	-	
T_{9}	0	0	5	0.00		
T_{10}	0	0	7.5	0.00	-	
T_{11}	0	0	10	0.00	-	
T_{12}	0	0	15	3.33	-	
T_{13}	0	0	150	8.66	-	
T_{14}	50	62.5	0	91.00	91.00	0.00
T_{15}	35	25	5	18.00	18.00	0.00
T_{16}	35	50	10	64.00	65.00	-1.00
T_{17}	35	62.5	15	94.66	91.30	3.36
T_{18}	35	75	150	98.66	99.09	-0.43
T_{19}	**50**	25	5	18.00	18.00	0.00
T_{20}	**50**	50	10	70.00	65.00	5.00
T_{21}	**50**	**62.5**	**15**	**94.66**	**91.30**	**3.36**
T_{22}	**50**	75	150	86.00	99.09	-13.09
T_{23}	50	62.5	7.5	54.33	91.00	-36.67
T_{24}	65	25	5	21.33	22.10	-0.77
T_{25}	65	50	10	77.00	66.75	10.25
T_{26}	65	62.5	15	95.33	91.73	3.60
T_{27}	65	75	150	99.00	99.13	-0.13
T_{28}	95	25	5	36.00	30.30	5.70
T_{29}	95	50	10	84.66	70.25	14.41
T_{30}	95	62.5	15	97.00	92.60	4.40
T_{31}	95	75	150	99.00	99.22	-0.22

Experiment 6

Table 8

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease**	**Expected Disease**	**Difference**

	g a.i/ha			control %	control %	
T_1	35	0	0	0.00	-	
T_2	50	0	0	0.00		
T_3	65	0	0	2.33	-	
T_4	95	0	0	10.00	-	
T_5	0	25	0	10.00		
T_6	0	50	0	58.66	-	
T_7	0	62.5	0	82.66	-	
T_8	0	75	0	90.66	-	
T_9	0	0	5	0.00		
T_{10}	0	0	7.5	0.00	-	
T_{11}	0	0	10	0.00	-	
T_{12}	0	0	15	1.66	-	
T_{13}	0	0	150	5.00	-	
T_{14}	50	62.5	0	81.66	82.66	-1.00
T_{15}	35	25	5	10.00	10.00	0.00
T_{16}	35	50	10	57.33	58.66	-1.33
T_{17}	35	62.5	15	90.00	82.95	7.05
T_{18}	35	75	150	96.33	91.13	5.20
T_{19}	**50**	25	5	9.66	10.00	-0.34
T_{20}	**50**	50	10	66.00	58.66	7.34
T_{21}	**50**	**62.5**	**15**	**95.33**	**82.95**	**12.38**
T_{22}	**50**	75	150	98.66	91.13	7.53
T_{23}	50	62.5	7.5	57.87	82.66	-24.79
T_{24}	65	25	5	12.00	12.10	-0.10
T_{25}	65	50	10	72.00	59.62	12.38
T_{26}	65	62.5	15	93.66	83.35	10.31
T_{27}	65	75	150	99.00	91.33	7.67
T_{28}	95	25	5	17.33	19.00	-1.67
T_{29}	95	50	10	83.60	62.79	20.81
T_{30}	95	62.5	15	93.30	84.65	8.65
T_{31}	95	75	150	98.66	92.01	6.65

Study 3:

Target disease	Leaf rust	*Puccinia recondita*

Experiment 7: Wheat seedlings were inoculated with a spore Suspension of Puccinia recondita (the causal organism of wheat leaf rust) 72hours prior to application and incubated in a saturated atmosphere at 20°C. for24h, then moved to a growth chamber at 20°C.for48h.The test suspensions were then sprayed to the point of run-off on the wheat seedlings. The following day the seedlings were moved to a growth chamber at 20°C. for 4 days, after which disease ratings were recorded.

Experiment 8: The test suspensions were sprayed to the point of run-of on wheat seedlings. The following day the seedlings were inoculated with a spore suspension of Puccinia recondite (the causal organism of wheat leaf rust)and incubated in a saturated atmosphere at 20°C. for 24h, and then moved to a growth chamber at 20°C. for 7days, after which disease ratings were made.

Experiment 7

Table 9

Treatments	Trifloxystrobin	Difenoconazole	Sulphur	Observed Disease control %	Expected Disease control %	Difference
	g a.i/ha					
T_1	35	0	0	30.00	-	
T_2	50	0	0	60.00		
T_3	65	0	0	72.00	-	
T_4	95	0	0	90.00	-	
T_5	0	25	0	16.00		
T_6	0	50	0	39.00	-	
T_7	0	62.5	0	60.00	-	
T_8	0	75	0	71.60	-	
T_9	0	0	5	0.00		
T_{10}	0	0	7.5	0.00	-	
T_{11}	0	0	10	0.00	-	
T_{12}	0	0	15	0.00	-	

T_{13}	0	0	150	5.00	-	
T_{14}	50	62.5	0	75.00	84.00	-9.00
T_{15}	35	25	5	40.33	41.20	-0.87
T_{16}	35	50	10	57.30	57.30	0.00
T_{17}	35	62.5	15	68.33	72.00	-3.67
T_{18}	35	75	150	89.33	81.11	8.22
T_{19}	**50**	25	5	64.33	66.40	-2.07
T_{20}	**50**	50	10	76.00	**75.60**	**0.40**
T_{21}	**50**	**62.5**	**15**	**95.33**	**84.00**	**11.33**
T_{22}	**50**	75	150	98.66	89.21	9.45
T_{23}	50	62.5	7.5	82.67	84.00	-1.33
T_{24}	65	25	5	75.33	76.48	-1.15
T_{25}	65	50	10	86.00	82.92	3.08
T_{26}	65	62.5	15	93.66	88.80	4.86
T_{27}	65	75	150	99.00	92.45	6.55
T_{28}	95	25	5	85.66	91.60	-5.94
T_{29}	95	50	10	94.00	93.90	0.10
T_{30}	95	62.5	15	98.00	96.00	2.00
T_{31}	95	75	150	100.00	97.30	2.70

Experiment 8

Table 10

Treatments	**Trifloxystrobin**	**Difenoconazole**	**Sulphur**	**Observed Disease control %**	**Expected Disease control %**	**Difference**
	g a.i/ha					
T_1	35	0	0	34.00	-	
T_2	50	0	0	72.00		
T_3	65	0	0	83.30	-	
T_4	95	0	0	88.66	-	
T_5	0	25	0	20.33		
T_6	0	50	0	40.00	-	
T_7	0	62.5	0	65.60	-	

T_8	0	75	0	73.00	-	
T_9	0	0	5	0.00		
T_{10}	0	0	7.5	1.00		
T_{11}	0	0	10	2.33	-	
T_{12}	0	0	15	5.66	-	
T_{13}	0	0	150	10.00	-	
T_{14}	50	62.5	0	87.66	90.37	-2.71
T_{15}	35	25	5	45.66	47.42	-1.76
T_{16}	35	50	10	61.00	61.32	-0.32
T_{17}	35	62.5	15	76.60	78.58	-1.98
T_{18}	35	75	150	90.33	83.96	6.37
T_{19}	**50**	25	5	75.66	77.69	-2.03
T_{20}	**50**	50	10	86.66	83.59	3.07
T_{21}	**50**	**62.5**	**15**	**94.66**	**90.91**	**3.75**
T_{22}	**50**	75	150	93.00	93.20	-0.20
T_{23}	50	62.5	7.5	89.00	90.46	-1.46
T_{24}	65	25	5	84.00	86.70	-2.70
T_{25}	65	50	10	92.30	90.21	2.09
T_{26}	65	62.5	15	95.33	94.58	0.75
T_{27}	65	75	150	99.00	95.94	3.06
T_{28}	95	25	5	90.00	90.97	-0.97
T_{29}	95	50	10	96.60	93.35	3.25
T_{30}	95	62.5	15	100.00	96.32	3.68
T_{31}	95	75	150	100.00	97.24	2.76

It is evident from the experiments above that better and optimum disease control is observed by the addition of sub-fungicidal amount sulphur in the formulation of the present invention as compared to the binary composition comprising strobilurin and azole fungicides.

Study 4:

Test Crop	**Tomato**	**Variety:** Heemsohna

Efficacy tested against following disease:

Disease name	Causal organism
Early blight	*Alternaria solani*

Field study was conducted for two seasons in 2019 & 2020 at Hansi (Haryana), Nursery was raised and healthy saplings of 28 days after sowing were collected for transplanting in the main field. Same plant population was maintained in each treatment plot. Plot was kept free of weeds by manual hand weedings at 20, 45 and 60 DAT. Disease severity was recorded from 3 plants/treatment after the specified days after each sprays and the mean was considered for further analysis.

Other data on phytotoxicity and yield was also recorded from each plot. Yield data was converted on per Hectare (Ha) basis.

1st Spray	-	At the appearance of initial symptoms of disease
2nd Spray	-	15 days after the First Spray

Plot Size	:	5 X 4 m = 20 Sq. m.	
No of treatments	:	9	
Triallayout		Randomised block design with Three replications	
Tomato Variety	:	Heemsohna	
Spacing	:	90 X 60 cm	
Fertilizer	:	N:P:K 50:25:25 kg/ha	
Sprayer used	:	Knapsack sprayer	
Spray volume	:	1.25 litre per 20 sq. m. plot	

Table 11

1	**Disease severity :** On 0 Day (pre count), 3rd, 7th and 14th Day after each spray disease severity was recorded and converted to % in comparison to control plot.
2	**Phytotoxicity:** Recorded plant phytotoxicity after sprays based on 0-10 scale of assessment of yellowing, Stunting, Chlorosis, Leaf tip injury, Wilting, Hyponasty/Epinasty for all treatments.

3	**Yield:** 1st., 2nd picking, subsequent the final picking. The total yield was converted in Mt/ha

The Disease severity was recorded by using the following scale prescribed by Mayee & Datar, 1986

Table 12

Score	**Disease symptoms of Early blight**
0	Disease free leaves of test plants
1	Sparingly small irregular brown spots covering maximum of 1% of leaf surface area
3	Small irregular, brown spots with concentric rings covering of 1% - 10% of leaf surface area
5	Enlarging of lesions, irregular, brown in colour with concentric rings, covering 11-25% of leaf surface area.
7	Lesions coalesce to form irregular, dark brown patches with concentric rings covering 26-50% of the leaf surface area, Lesions also appear on stems and petioles of affected plants.
9	Lesions coalesce to form irregular, dark brown patches with concentric rings covering >51% of the leaf surface area, Lesions also appear on stems and petioles of affected plants.

Table 13

Details of the treatments done					**Mean of Two sprays**		**Difference**
S.No	**Active Ingredient g a.i./ha dose**			**Formulation Quantity (g/ha)**	**Observed efficacy % on 14th DAT**	**Expected Efficacy according to Colby (%)**	
T1	Tank-mix(Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+50+15	115	250+200+18.75*	72.00	39.20	32.80
T2	Trifloxystrobin 20% WG+ Difenoconazole	50+62.5+7.5	120	250+250+9.375*	65.33	69.40	-4.07

	25% EC+ Sulphur 6% WG						
T3	(Trifloxystrobin 20% + Difenoconazole 25% + Sulphur 6%) SC	50+62.50+15	127.5	250	86.66	47.75	38.91
T4	Tank-mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+30	142.4	250+300+37.7*	87.00	48.85	38.15
T5	Tank-mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+150	262.5	250+300+187.5*	82.00	50.50	31.50
T6	Tank-mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+500	612.5	250+300+625*	80.00	57.65	22.35
T7	Tank-mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+75+15	140	250+300+18.75*	88.00	59.15	28.85
T8	(Trifloxystrobin 20% + Difenoconazole 25% + Sulphur 6%) SC	100+125+30	255	500	85.60	61.87	23.73
T9	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+50	100	250+200*	36.00	-	
T10	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+62.5	112.5	250+250*	45.00	-	
T11	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+75	125	250+300	57.00	-	
	Trifloxystrobin	100+125	225	500+500*	59.00	-	

T12	20% WG + Difenoconazole 25% EC						
T13	Sulphur 80% WG		500	625	23.00	-	
T14	Sulphur 80% WG		150	187.5	10.00	-	
T15	Sulphur 80% WG		30	37.5	7.00	-	
T16	Sulphur 80% WG		15	18.75	5.00	-	
T17	Sulphur 80% WG		7.5	9.375	1.30	-	

<u>Phytotoxicity Observations</u>

Table 14

Treatments	**Details of Treatment**	**Dose a.i./ha**		**Dose Formulation(s) g or ml/Ha**	**Phytotoxicity % after 14 days of spray (mean of 2 sprays)**		
					On leaves	**On flowers and Flower drops**	**Fruits and fruit drops**
T_1	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+50+15	115	250+200+18.75*	NP	NP	NP
T_2	Trifloxystrobin 20% WG + Difenconazole 25% EC + Sulphur 80%	50+62.5+7.5	120	250+250+9.375*	NP	NP	NP

	WG						
T_3	Trifloxystrobin 20% + Difenoconazole 25% + Sulphur 6%SC	50+62.50+15	127.5	250	NP	NP	NP
T_4	Tank mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+30	142.4	250+300+37.5*	NP	NP	NP
T_5	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+150	262.5	250+300+187.5*	NP	NP	NP
T_6	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+500	612.5	250+300+625*	NP	2.66	1.33
T_7	Tank- mix (Trifloxystrobin 20% WG + Difenoconazo	50+75+15	140	250+300+18.75*	NP	NP	NP

	le 25% EC + Sulphur 80% WG)						
T_8	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	100+125+30	255	500	NP	NP	NP
T_9	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+50	100	250+200*	NP	NP	NP
T_{10}	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+62.5	112.5	250+250*	NP	NP	NP
T_{11}	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+75	125	250+300*	NP	NP	NP
T_{12}	Trifloxystrobin 20% WG + Difenoconazole 25% EC	100+125	225	500+500*	NP	NP	NP
T_{13}	Sulphur 80% WG		500	625	NP	1.66	NP
T_{14}	Sulphur 80% WG		150	187.5	NP	NP	NP
T_{15}	Sulphur 80% WG		30	37.5	NP	NP	NP
T_{16}	Sulphur 80%		15	18.75	NP	NP	NP

	WG						
T_{17}	Sulphur 80% WG		7.5	9.375	NP	NP	NP

*NP: No Phytotoxicity

At higher doses of Sulphur there were occasional lesions which recovered with passing of time. At low concentrations of Sulphur there was no phytotoxicity either on leaves or fruiting bodies. However, there was a reported greening effect due to the composition of present invention at all the tested doses.

<u>Effect on Yield of Tomato</u>

Table 15

Treatments	**Details of Treatment**	**Dose a.i./ha**		**Dose Formulation (s) g or ml/Ha**	**Tomato yield kg/ha (observed)**			**% yield increase over control**
					First season	**Second season**	**Mean of two seasons**	
T_1	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25%EC + Sulphur 80% WG)	50+50+15	115	250+200+18.75*	19.84	18.77	19.305	141.7658109
T_2	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+7.5	120	250+250+9.375*	19.33	17.67	18.50	131.68
T_3	Trifloxystrobin 20% + Difenoconazole 25% + Sulphur 6%	50+62.50+15	127.5	250	21.45	20.98	21.215	165.6856606

	WG							
T_4	Tank mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+30	142.4	250+300+37.5*	20.10	19.67	19.885	149.0294302
T_5	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+150	262.5	250+300+187.5*	18.43	18	18.215	128.115216
T_6	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+62.5+500	612.5	250+300+625*	17.70	17.8	17.75	122.2917971
T_7	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	50+75+15	140	250+300+18.75*	21.00	20.9	20.95	162.366938
T_8	Tank- mix (Trifloxystrobin 20% WG + Difenoconazole 25% EC + Sulphur 80% WG)	100+125+30	255	500	20.80	21.05	20.925	162.053851
T_9	Trifloxystro	50+50	100	250+200*	16.66	17.1	16.88	111.3963

	bin 20% WG + Difenoconazole 25% EC							682
T_{10}	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+62.5	112.5	250+250*	18.23	17.98	18.105	126.7376331
T_{11}	Trifloxystrobin 20% WG + Difenoconazole 25% EC	50+75	125	250+300*	18.90	17.88	18.39	130.3068253
T_{12}	Trifloxystrobin 20% WG + Difenoconazole 25% EC	100+125	225	500+500*	18.00	18.4	18.2	127.9273638
T_{13}	Sulphur 80% WG		500	625	8.54	8.6	8.57	7.326236694
T_{14}	Sulphur 80% WG		150	187.5	8.28	8.42	8.35	4.571070758
T_{15}	Sulphur 80% WG		30	37.5	7.96	8.33	8.145	2.003757044
T_{16}	Sulphur 80% WG		15	18.75	8.05	7.88	7.965	-0.25046963
T_{17}	Sulphur 80% WG		7.5	9.375	7.67	8.33	8.00	0.19
T_{18}	Untreated Control	-	-	-	7.74	8.23	7.985	0

Storage stability and shelf life study

Table 16 (Storage Stability test of the composition of present invention)

Parameters	Specification (In House)	Initial	Cold storage stability at 0 ± 2 ^{0}C for 14 days	Heat stability study at 54 ± 2 ^{0}C for 14 days	Heat stability study at 54 ± 2 ^{0}C for 21 days	Heat stability study at 54 ± 2 ^{0}C for 28 days	Heat stability study at 54 ± 2 ^{0}C for 35 days	Heat stability study at 54 ± 2 ^{0}C for 42 days
Description	Off-white	Complies	Complies	Complies	Complies	Complies	Complies	Compl

	to light brown							ies
Trifloxystrobin Content	21-19	20.4	20.4	20.3	20.3	20.2	20.1	20.1
Trifloxystrobin Suspensibility	Min 60%	97.6	97.5	96.5	96.4	96.1	95.8	95.7
Difenoconazole Content	23.75-26.25	25.5	25.4	25.4	25.3	25.1	24.9	24.8
Difenoconazole Suspensibility	Min 60%	99.3	99.3	98.7	98.7	98.2	97.8	97.5
Sulphur Content	5.7-6.6	6.2	6.2	6.1	6.1	6	6	6
Sulphur Suspensibility	Min. 60	99.9	99.9	99.2	99.2	98.9	98.7	98.4
pH (1% aqeous Solution)	4 to 9	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Wettability	Max 120 s	67	69	67	67	71	71	71
Wet Sieve(Passes through 75 micron)	Min 98.0%	99.5	99.5	99.5	99.5	99.5	99.5	99.5
Bulk Density	0.25-0.85	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Moisture Content	Max 5.0%	1.6	1.6	1.6	1.6	1.6	1.6	1.6

Shelf Life Study Details

Table 17

Room temperature storage data								
Parameters	**Specification**	**Study Duration**						
	In House	**1 month**	**6 month**	**12 month**	**24 months**	**30 months**	**36 months**	**42 months**
Description	Off-white to light brown	Complies	Complies	Complies	Complies	Complies	Complies	Complies

Trifloxystrobin Content	21-19	20.4	20.4	20.3	20.3	20.2	20.1	20.1
Trifloxystrobin Suspensibility	Min 60%	97.6	97.5	96.5	96.4	96.2	96.1	96
Difenoconazole Content	23.75-26.25	25.5	25.4	25.4	25.3	25.2	25.1	25.1
Difenoconazole Suspensibility	Min 60%	99.3	99.3	98.7	98.7	98.6	98.4	98.3
Sulphur Content	5.7-6.6	6.2	6.2	6.1	6.1	6	6	6
Sulphur Suspensibility	Min. 60	99.9	99.9	99.2	99.2	98.9	98.7	98.5
pH (1% aqeous Solution)	4 to 9	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Wettability	Max 120 s	67	69	67	67	71	71	71
Wet Sieve(Passes through 75 micron)	Min 98.0%	99.5	99.5	99.5	99.5	99.5	99.5	99.5
Bulk Density	0.25-0.85	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Moisture Content	Max 5.0%	1.6	1.6	1.6	1.6	1.6	1.6	1.6

The shelf life of commercially available formulation comprising strobilurin and triazole fungicide is 2 years.However, the composition of the present invention is found to be stable for at least 42 months.

Effect of Sulphur on dispersibility of WDG formulation

Table 18

WG (Water Dispersible Granule)						
Sr. No.	**Component**	**Composition**				
		1	2	3	4	5
1	Trifloxystrobin Technical	20	20	20	20	20
2	Difenoconazole Technical	25	25	25	25	25
3	Sulphur Technical	0	2	4	6	7
4	Sodium Polycarboxylate	8.00	11.00	10.00	1.00	10.00

5	Sodium Lauryl Sulfate	6.00	7.00	4.00	5.00	4.00
6	Sodium ligno sulfonate	2.00	1.00	1.00	1.00	1.00
7	Sodium alkylnaphthalenesulfonate, formaldehyde condensate	0.50	0.50	0.50	0.50	0.50
8	Silicone based antifoam	0.10	0.10	0.10	0.10	0.10
9	Blend of poly terpene resin(natural oils)	0.10	0.10	0.10	0.10	0.10
10	Precipitated Silica	0.10	0.10	0.10	0.10	0.10
11	China Clay	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100	QS to Make 100

Table 19

WG (Water Dispersible Granule)						
Sr. No.	**Parameter**	**Composition as per Table 18**				
		1	2	3	4	5
1	Dispersibility	48.67%	65.39%	87.21%	96.34%	96.92

It is evident that the dispensability increases with the increase in % of Sulphur content.

It was observed that with the addition of optimum amount of Sulphur along with adjuvants, the formulation had increased dispersibility and hence was homogeneous throughout its shelf life. Thus, the formulation of the present invention showed increased uptake of strobilurin and triazole actives and is found to be more efficacious.

From the foregoing it will be observed that numerous modifications and variations can be effectuated without departing from the true spirit and scope of the novel concepts of the present invention. It is to be understood that no limitations with respect to the specific embodiments illustrated is intended or should be inferred. It should be understood that all such modifications and improvements have been deleted herein for the sake of conciseness and readability but are properly within the scope of the following claims.

We Claim:

[CLAIM 1]. A synergistic fungicidal composition comprising of:

a. Trifloxystrobin or its agrochemically acceptable salts in the range of 7-10% by weight of the composition; and

b. Difenoconazole or its agrochemically acceptable salts in the range of 10- 12.5% by weight of the composition; and

c. Sulphur as a catalyst and or a performance enhancer in the range of 2-3% by weight of the composition; and

d. One or more of agrochemically acceptable excipients

[CLAIM 2]. The synergistic fungicidal composition as claimed in claim 1 which further comprises organosilicone surfactants as spreading and sticking agents and bio based efficacy enhancing agents

[CLAIM 3].The fungicidal composition as claimed in claim 1 and 2, wherein the agrochemically acceptable excipients are adjuvants, wetting agent, dispersing agent, thickening agent, antifoaming agent, anti-freezing agent, anti-bacterial agent, dye, filler and preservative thereof.

[CLAIM 4]. The fungicidal composition as claimed in claim 3, wherein the agrochemically acceptable adjuvants are selected from Silicone Ethoxylated Oil, Polyvinyl Pyrrolidon-,Poly vinyl Alcohol, Blend of poly terpene resin, polyterpene a and present in the range of 01-10% by weight of the total composition.

[CLAIM 5]. The fungicidal composition as claimed in claim 3, wherein wetting agent is selected form the group consisting of Tristyrylphenol ethoxylate nonionic emulsifier/mixture of non-ionic surfactants & Alkoxylated Alcohol/Block copolymer and mixtures thereof and present in the range of 0.5-10% weight of the total composition.

[CLAIM 6]. The fungicidal composition as claimed in claim 3, wherein dispersing agent is selected form the group consisting of Tristyrylphenol Ethoxylate Amine salt of phosphate tristyryl phenol ethylated /Acrylic Copolymer/ Ethoxylated Tristryl phenol Sulphate, Naphthalene sulfonic acid, sodium salt condensate with formaldehyde, Ethoxylated oleyl cetyl alcohol, Polyalkelene glycol ether and mixtures thereof and present in the range of 0.5-10% weight of the total composition.

[CLAIM 7]. The fungicidal composition as claimed in claim 3, wherein antifoaming agent is selected form the group consisting of silicon emulsion based anti-foam agents, Siloxane polyalkyleneoxide, trisiloxane ethoxylates and mixtures thereof and present in the range of 0.01-1% weight of the total composition.

[CLAIM 8]. The fungicidal composition as claimed in claim 3, wherein anti-freezing agent is selected from the group consisting of Glycol, Propylene Glycol, Mono ethylene glycol, Glycerin and mixtures thereof and present in the range of 0.1-10% weight of the total composition.

[CLAIM 9]. The fungicidal composition as claimed in claim 3, wherein thickening agent is selected from the group consisting of Polysaccharides/carboxymethyl cellulose/Bentonite Clay and mixtures thereof and present in the range of 0.01-3% weight of the total formulation.

[CLAIM 10]. The fungicidal composition as claimed in claim 3, wherein anti-bacterial agent is selected from Benzisothiazolin-3-one or Formaldehyde and present in the range of 0.01-1% weight of the total composition.

[CLAIM 11]. The fungicidal composition as claimed in claim 3, wherein filler is selected from Silicon Dioxide/China -Clay/Kaolin/Talc/starch and present in the range of 0.1-5% weight of the total composition.

[CLAIM 12] The fungicidal composition as claimed in claim 3, wherein the formulation is in the form of, wettable powders (WP), flowable slurry (FS), , granules (GR), water dispersible granules (WG) Suspension concentrate (SC), Suspo-emulsion (SE) or combination thereof.

[CLAIM 13]. The fungicidal composition as claimed in claim 3, wherein the formulation is applied to a plant/crop by spraying, rubbing, dusting, pouring, mist blowing, soil mixing, drenching, dipping or drip irrigation.