

# Pests and diseases of tea (*Camellia sinensis*)

<sup>[1]</sup>Mittu Katoch, <sup>[2]</sup>Satyanarayan Murthy Malladi

Department of Botany, P.hD Scholar, Lovely Professional University, Phagwara, Jalandhar, Punjab, India

**Abstract:** Tea is the most well-known drink devoured after water. Tea, *Camellia sinensis* (L) O. Kunze (Theaceae) is the real estate trim developed in Sri Lanka. With its wide flexibility, tea is developed in a scope of atmospheres and soils in various agro biological districts (AERs). Efficiency of tea relies upon different ecological and natural factors regardless of the cultivar developed. The yield and soil administration rehearses received, changing climate conditions and bug and illness rates additionally decide the general harvest efficiency.

It is fermented from the leaves of *Camellia sinensis* (family: Theaceae). Diverse sorts of tea fabricated are: oolong, green, dark and Ilex tea relying upon the post-gather treatment and satisfactoriness of a specific area. Being rich in regular cell reinforcements, tea is accounted for to be compelling against colon, oesophageal, and lung diseases, and also urinary stone, dental caries, and so on. Tea observed to be insect cariogenic, against microbial, calming, hostile to cancer-causing, against oxidant can be utilized as a successful preventive operator. India is one of the biggest tea-delivering, trading and devouring nations.

Every tea developing territories has its own unmistakable nuisances and infections however a few of them may have been recorded from more than one area. Number of vermin and ailments related with tea plants in a zone relies upon the period of time for which it is developed around there. More than one thousand types of arthropod bothers and almost 400 pathogens are known to assault tea everywhere throughout the world, however just around 300 types of bugs and parasites and 58 pathogenic growths are recorded from tea in India. Yield misfortune because of bug and maladies changes in the vicinity of 15 and 20%. Extent of the misfortunes will undoubtedly be higher today in perspective of the expanded generation and profitability other than the varieties in climatic conditions.

Bugs are not kidding vermin of tea and they harm the green tissues of leaves, along these lines decreasing the photosynthetic effectiveness bringing about yield lessening. Invasion prompts staining of clears out. The majority of the species possess the under surface of the leaves yet a couple of favor the upper surface moreover. In this survey paper we learn about different irritations, infection and their contro

**Keywords:** *Camellia sinensis*, Pests and diseases, Traditional.

## I. INTRODUCTION

Tea, a conventional drink initially from China, is the most seasoned, most prevalent, non-alcoholic caffeine containing refreshment on the planet, and its imbue is set up by fermenting of handled leaves of the tea plant, *Camellia sinensis* (Kumar and Shruthi, 2014).

Today, India is one of the biggest tea makers on the planet and around 70% of tea delivered is devoured inside India itself. By the side road the century, Assam turned into the main tea creating area on the planet. In any case, because of certain particular soil and climatic prerequisite sits development was restricted to just certain parts of the nation. (Arya, 2013).

The developed taxa of tea contain three principle normal half and halves. They are: *C. sinensis*(L.) O. Kuntze or China sort, *Camellia assamica*(Masters) or Assam sort and *C. assamica* subsp.*Lasiocalyx* (Planchon ex Watt) or Cambodor Southern sort. Two sorts, which are outstanding, are the China and Assam, less common is the Cambod (Yemane et al. 2008).

Tea is second just to water as the most expended savor the world. It has been utilized restoratively for a considerable length of time in India and China. Green tea is relatively more advantageous than dark and Oolong tea. Writing

additionally recommends polyphenols as potential markers of dry spell resistance in *Camellia sinensis* (Cheruiyot et al., 2007) in view of variety of shoot epicatechin and epigallocatechin substance in light of water push (Cheruiyot et al., 2008).

In India, it is developed in Barak/Brahmaputra valley/Dooars and other sloping territories of India (i.e., Darjeeling, Himachal, Nilgiri, and Uttaranchal). In general, the plant is kept as an evergreen bush by pruning.

The initial two leaves and a bud are culled for tea handling. In tropical nations, tea grounds are gathered throughout the entire year, while in calm nations reaping is regular. Tea is an evergreen, perpetual, cross-pollinated, C3 plant and in nature, the tea tree can achieve a tallness of 20–30 m. Notwithstanding, under developed condition, the shrub tallness of 60–100 cm is kept up for reaping the delicate leaves, which keeps blazing significantly over 100 years.

Environmental change is the best test confronting mankind worldwide and in this century. Africa is a standout amongst the most defenceless locales to environmental change and is likely the most incapacitated. Environmental change is an adjustment in normal climate conditions or the conveyance of occasions around that normal (e.g., progressively or less extraordinary climate occasions) principally because of an unnatural weather change. A worldwide temperature alteration is the watched temperature increment in the course

of the last >50 years because of the expansion of ozone depleting substance focuses in the environment (Solomon, et al., 2009). Green house gasses add to the nursery impact on the world's surface. The biggest contributing wellspring of ozone depleting substance is the consuming of petroleum derivatives prompting the outflow of carbon dioxide. The discharge of carbon dioxide into the earth primarily from copying of non-renewable energy sources (oil, gas, oil, lamp fuel, and so forth.) has been expanded significantly finished the previous 50 years (Solomon, et al., 2009).

#### **PEST AND DISEASE MANAGEMENT :**

Tea, as other farming harvests in India is invaded with various bug vermin and ailments. A large portion of the tea vermin are very regular; many assault tea just amid dry season while a couple are bottomless in wet climate; there are a couple of lasting bugs as well. The harvest misfortune in tea because of nuisances, infections and weeds differs in the vicinity of 15 and 20 percent relying on the power of assault (Muraleedharan, 2005). In India, bother control in tea is for the most part centered around the use of all the accessible segments of Integrated Pest administration keeping in mind the end goal to dodge deposit issues of concoction pesticides, spoiling of tea, lethal dangers to administrators and characteristic adversaries of bug bugs. Eco amicable methodologies in bug administration have as of now picked up force and accentuation has additionally been given to the option measures supplemented with the present practices of synthetic control (Gurusubramanian et al., 2005; Rahman et al., 2005). Social control by changing the microclimate of the tea bramble, sanitation, expulsion of interchange has, weeds, cleaning/debarking of shade trees, support of hedge cleanliness and so on., mechanical and physical control by methods for hand accumulation of creepy crawly bugs, light catching, sticky catching and so on are the absolute most usually utilized vermin control implies received by the Indian tea industry. Additionally look into on improvement of target 3 particular microorganism based pesticides for real irritations of tea, conduct changing chemicals, for example, pheromones of real tea creepy crawlies, raising and probability investigations of parasite predators of real bug nuisances and herbal construct pesticides are in light of advance. The assurance of pesticide deposits in tea plant, soil, water, dark tea and blend is another area of much significance. Information era on the buildups of synthetic pesticides as required by both national and universal bodies versus new more secure protestants which can be utilized as a part of tea are being done routinely. Stricter checking of pesticides buildup in made tea tests are additionally being done on consistent premise.

The motivation behind this guide on sicknesses related with tea (*Camellia sinensis*) is to help with issue distinguishing proof and bring issues to light of genuine plant ailment pathogens, Blister curse, horse-hair scourge, and twig dieback/stem ulcer are exceptionally ruinous ailments found in significant tea-creating districts. It is vital to keep such illnesses from entering the state, since they are extremely hard to destroy or even to oversee once settled. You ought to know that there is a danger of bringing new ailments into the state through tainted plants notwithstanding when they don't have clear ailment side effects. Early identification is regularly basic to accomplishment in destroying new sicknesses. Acquaint yourself with the manifestations of genuine tea infections. Legitimate distinguishing proof is basic for settling on sound vermin administration choices. In the event that you speculate issues however are new to the illness manifestations, we prescribe that you submit tests to CTAHR's Agricultural Diagnostic Service Center for distinguishing proof. Tests for ADSC might be taken to the closest Cooperative Extension Service office. For more data on gathering tests, see "Gathering plant sickness and bug bother tests for issue determination"

#### ***Various common pests which attack tea plantation:***

***Pink vermin, Acaphylla theae (Eriophyidae: Acarina):*** Important parasite nuisance of tea in southern India causes significant harm. Amid early phases of assault leaves turn pale and twist upwards while serious invasion prompts earthy staining. Pink bugs assault delicate product shoots where "Assam" crossovers are more defenceless. Eggs are glossy, globular fit as a fiddle and lay separately on the under surface of the takes off. Eggs are brings forth in 2-3 days; there are two nymph stages and they are white in shading. Populace develops starts in November/December and accomplishes crest in February/March and declined amid May/June. Life cycle finished in 6-9 days.

***Purple vermin, Calacarus carinatus (Eriophyidae: Acarina):***

Damaged departs portrayed by the coppery dark colored staining; nearness of various white cast skins of the parasites alongside the live bugs; purple bugs are pervasive on the under surface of develop leaves; grown-ups are little, axle formed, purple shading; bordered body with five longitudinal white waxy edges on dorsal side, youthful ones shed three times; brooding period ranges 3-5 days with two nymphal stages while add up to formative period was 6-11 days.

***Pale parasite, Acaphyllisa parindiae (Eriophyidae: Acarina):***

Adult vermin is pale white and dorsoventrally leveled; comprehensively adjusted front end and decreasing back end; seen on the under surface of the develop foliage; hatching period 2-3 days, nymphal stages 4-6 days; improvement finished in 6-9 days.

***Red bug, Brevipalpus australis (Tenuipalpidae : Acarina):***

Symptoms of assault initially show up on either side of the midrib and bit by bit spread to the whole leaf; nourishing prompts darker discolouration of leaves and serious invasion prompts defoliation; grown-up parasite is red in shading and obovate fit as a fiddle; generation is by parthenogenesis. Eggs are brilliant red, circular, laid in groups; hatching period is 7-10 days; formative stages incorporate three legged hatchling, protonymph and deutonymph and each formative stage is trailed by a calm stage; life cycle finished in 30-36 days

***Yellow parasite, Polyphagotarsonemus latus (Tarsonemidae: Acarina):***

seen on youthful leaves, particularly on the main a few leaves and the bud. Leaves turn out to be harsh and fragile and corky lines or fixes at first glance. Females are yellowish and greater than the guys and they conveying the "female sprites" on their back. Eggs huge, obovate, leveled at the base; eggs brings forth following 27-32 hours and life cycle finished in 3-5 days.

***Control measures*** (of above recorded bug species) incorporate observing the field populace by consistent appraisals, direction of the shade trees according to proposal and improving the populaces of normal foes (phytoseiid parasites, ruthless thrips and cecidomyiids) in tea biological system. Utilization of spore suspension of the entomopathogen, *Parcilymyces jomosotroscus* (UPASI sthain) Mycomihc @ 1.5 kg/ha or neem details 0.03-0.15% Aza @ 1000 ml/ha or 1% @ 200-400 ml/ha or 5% @ 100-200 ml/ha or sulfur plans 80% @ 1000 g/ha or dicofol 18.5 EC @ 1000 ml/ha or ethion 50 EC @ 750 ml/ha are suggested. While utilizing power sprayers utilize a splash volume of 300-350 l/ha or 400-450 l/ha with hand worked rucksack sprayer.

***Red creepy crawly parasite, Oligonychus coffeae (Tetranychidae: Acarina):***

Important vermin bug causes extensive harm amid the previous couple of years. Pervasion begins along midrib and veins additionally spreads to the whole upper surface of takes off. Because of sustaining, the support foliage turns rosy bronze and plagued fields particular even from a long separation. Extreme invasion prompts defoliation. Grown-up

female circular fit as a fiddle, splendid blood red interiorly and dull purplish darker posteriorly. Vermin turn a web of smooth strings on the leaf. Eggs rosy, circular, furnished with a little fiber. Brooding period is 4-6 days, before bring forth turns out to be light orange shading. Formative stages incorporate six legged hatchling, protonymph and deutonymph. Each formative stage is trailed by a calm stage and life cycle finished in 10-14 days.

Control measures of red creepy crawly vermin can comprehensively named social, organic and compound control strategies. Social control measures incorporate checking the populace progression by general field appraisal, shade/weed administration and evacuation of substitute host plants (*Bidens*, *Ageratum*, *Conyza*, *Crassocephalum*, and so forth). Organic control measures incorporate permitting the development of regular foes (phytoseiid parasites and coccinellid bugs (woman winged animal scarabs) in tea biological system and use of spore suspension of the entomopathogen, *Verticillium lecanii* @ 1.5 kg/ha at night hours when mugginess is more. Certain chemicals were prescribed for control of red creepy crawly vermin which incorporate splash plans of sulfur 80% @ 1000 g/ha, lime sulfur @ 1:40. On the off chance that vermin holds on splash any of the acaricides like dicofol 18.5 EC @ 1000 ml/ha, ethion 50 EC @ 750 ml/ha, fenprothrin 10 E @ 500 ml/ha, blend of dicofol and ethion 500 ml each and dicofol and quinalphos @ 500 + 350 ml are compelling against the bug. While utilizing power sprayers utilize a shower volume of 350-400 l/ha or 450-500 l/ha with hand worked backpack sprayer. Care must be taken to completely splash the support foliage and chemicals ought to be connected simply subsequent to culling.

***Tea mosquito, Helopeltis theivora (Miridae: Heteroptera: Hemiptera):***

Adults and fairies punctures the plant tissues with needle like platform and suck the sap from buds, youthful leaves and delicate stems. Punctures show up as rosy dark colored spots and because of concentrated sustaining, leaves twist up, seriously distorted and stay little. Shoots become scarce and trim misfortune is close aggregate in light of serious rate. Grown-ups dark in shading, red thorax, highly contrasting belly and greenish darker wings. They were dynamic early mornings and late nighttimes, more in damp shaded territories. Five nymphal stages and advancement finished in 15-17 days. Its rate was high amid July to December and low amongst January and June.

Observing the pervasion level in the field, dark culling, weed control and expulsion of stalks containing tea mosquito eggs are essential social control strategies.

Permitting building up of egg parasitoid (*Erythmelus helopeltidis*) in the tea environment is a suggested natural control measure. Certain particles, endosulfan 35 EC @ 1000 ml/ha, quinalphos 25 EC @ 750 ml/ha, chlorpyrifos 20 EC @ 750 ml/ha, fenthion 80 EC @ 200 ml/ha, quinalphos 25 EC + dichlorvos 76 EC @ 750 + 250 ml/ha suggested for control of tea mosquito. Showering is recommended in the early mornings or nighttimes when these bugs are dynamic.

***Lygus bug, Lygus sp. (Miridae: Heteroptera: Hemiptera):*** Adults and sprites harm the delicate plant parts. Mouth parts are penetrating and sucking sort. Encouraging punctures show up as ruddy dark colored necrotic spots. Side effects of harm are like that caused by *Helopeltis* assault and it can be controlled as nitty gritty for *Helopeltis*.

***Tea aphid, Toxoptera aurantii (Aphididae: Homoptera: Hemiptera):***

Colonies seen on delicate shoots of youthful plants and shrubs recuperating from pruning. Grown-ups and youthful stages suck the sap from delicate shoots. Because of bolstering leaves twist up and hindered shoot development watched. Assault on youthful buds postpones the recuperation of pruned brambles. States of aphids comprise of dim darker winged and apterous grown-up females and sprites. Populace is more from January to April and low amid June/July. Observing the populace in the field with yellow dish water trap, upkeep of managed shade and manual evacuation of pervaded shoots decrease the populace to a degree. Aphids are generally controlled by biocontrol specialists where hatchlings of the syrphids and the coccinellids are real predators taken after by three types of aphidiid parasitoids. On the off chance that nuisance holds on utilization of neem plans 0.03-0.15% Aza @ 1000 ml/ha or 1% @ 200-400 ml/ha or 5% @ 100-200 ml/ha or spore suspension of the entomopathogen, *Paeecilomyces fumosoroseus* @ 1.5 kg/ha at night hours when dampness is more are suggested.

***Coarse bug, Nipaecoccus viridis (Pseudococcidae: Homoptera: Hemiptera):*** Feeds on the youthful shoots and its extreme invasion prompts defoliation. Grown-up female delicate bodied, oval, straightened, dim dark colored, 2.5-3.0 mm long, female laid an extensive number of eggs, brings forth out in 7-10 days with an aggregate formative time of 15-20 days. Checking the field populace and manual evacuation of swarmed branches controls Mealy bug populace. On the off chance that irritation holds on Quinalphos 25 EC @ 500 ml/ha or dimethoate 20 EC @ 500 ml/ha is prescribed. Expansion of non ionic wetting operator (5 ml/10 l of water) will be useful in accomplishing better control.

***Darker bug, Saissetia coffeae (Coccidae: Homoptera: Hemiptera):***

Mature scales are: hemispherical fit as a fiddle and profound darker in shading; happens on leaves and delicate stems; females are inactive; grown-up guys are winged structures; Eggs are seen under the scale; crawlers scatter and join themselves with delicate plant parts in the wake of incubating. Dark colored bugs actually directed by the parasitoids, *Encyrtus infelix* and *Coccophagus cowperi* and it can be controlled as prescribed for Mealy bug.

***Green scale, Coccus viridis (Coccidae: Homoptera: Hemiptera):***

Observed on delicate stems and leaves; females yellowish green in shading and oval fit as a fiddle; proliferation by parthenogenesis, female lay 600 eggs; eggs incubate out instantly after affidavit; three nymphal instars enduring 4 a month and a half; grown-ups live for 2-5 months. It can be controlled as prescribed for coarse bug.

***Tea Jassid, Empoasca flavescens (Cicadellidae: Homoptera: Hemiptera):***

Adults and fairies suck the sap from delicate leaves; leaves twist downwards, bit by bit turn darker and become scarce; grown-ups are yellowish green and measure 2.5-2.75mm long; eggs embedded separately into the leaves; brooding period shifts from 6-13 days; improvement finished in 8-15 days as per the temperature. Culling evacuates an expansive piece of eggs and fairies and it can be controlled as suggested for coarse bug.

***Tea Thrips, Scirtothrips bispinosus (Thripidae: Thysanoptera):***

Prefers youthful leaves and buds; persistent encouraging causes gashes which show up as streaks; leaf surface ends up plainly uneven and twisted; sustaining blemishes on the buds later show up as two parallel lines; assault more articulated in the fields recuperating from pruning; prompts excessive deferral in tipping and ensuing harvest misfortune; grown-ups portrayed by their darker stomach area, Incubation period is 6-8 days; egg bring forth into hatchling, two larval instars, velvety white in shading, noticeable eyes; prepupa and pupae are found in the leaf litter and soil; grown-ups rise up out of the pupae following 3-5 days; feeble fliers, dispersal and relocation is helped by twist; develop begins by Nov/Dec. achieves top in Feb/March or April/May. Checking the populace in the field with yellow sticky traps and upkeep of normal shade other than the characteristic adversaries like Anthocorids and savage thrips can lessen the populace. Recommended to apply the spore suspension of the entomopathogen, *Verticillium lecanii* @ 1.5 kg/ha at night hours when mugginess is more. Certain

chemicals were prescribed for control of thrips; quinalphos 25 EC @ 750 ml/ha; dimethoate 20 EC @ 500 ml/ha; endosulfan 35 EC @ 1000 ml/ha; quinalphos 25 EC + dichlorvos 76 EC @ 750+250 ml/ha. Splash ought to be focused to the shoots on and beneath the culling table, and furthermore the side.

***Flushworm, Cydia leucostoma (Tortricidae: Lepidoptera):***

Larva is darker in shading 1 cm long; goes into the bud by making a little gap, ties up the edges of developing bud and frame a case; encourages on the upper epidermis of leaves; influenced leaves turn out to be harsh, crinkled and rugged; grown-up moth little, under 1cm long blackish darker in shading; eggs are light yellow and laid independently on the undersurface of develop leaves; brooding period 4-5 days, five larval instars; hatchling takes 19-25 days for advancement inside the leaf case; pupal period changes from 8-10 days; moths were dynamic amid morning and night hours; Control measures incorporate manual expulsion of plagued shoots. Flush worm is normally managed by the larval and pupal parasitoids; if bug continues shower neem definitions 0.03-0.15% Aza @ 1000 ml/ha or 1% @ 200-400 ml/ha or 5% @ 100-200 ml/ha or splash the spore suspension of the entomopathogen, *Paecilomyces fumosoroseus* @ 1.5 kg/ha at night hours when dampness is more.

***Looper caterpillar, Buzura suppressaria (Geometridae: Lepidoptera):***

Young caterpillars feast upon youthful leaves and develop hatchlings lean toward more seasoned leaves; they made arrangement of little openings along and somewhat far from the edge; in extreme instances of assault, tea shrubs totally stripped; female stores upto 200 eggs in groups on the tree trunks; brooding period 7-10 days; on rise, caterpillars suspend by smooth strings and get scattered by wind; hatchlings dim darker with pale greenish white lines on the back and side; on the leaves, they move like parasites; following 4-5 weeks, they pupated in the dirt for a time of 3-4 weeks; pupa earthy, 2-2.5 cm long, life cycle finished in 8-10 weeks.

***Twig caterpillar: Ectropis bhurmitra (Geometridae: Lepidoptera):***

Young caterpillars feast upon youthful leaves and develop hatchlings favour more established leaves; in serious instances of assault, entire leaves are eaten off, leaving the midrib; grown-up substantial pale dim wings and thin body; eggs are somewhat blue laid in bunches; secured by a mass of buff hued hairs; brooding period is 7-10 days; develop hatchlings are dim dark colored 4.5 cm long; while resting the hatchlings are nearly take after a dry twig; larval period is finished in 3-4 weeks and pupated in the dirt; pupae are 1.5-2

cm long and rosy darker shading; life cycle is finished in around 5 weeks.

***Blue striped vex grub, Latoia lepida (Limacodidae: Lepidoptera):***

Feeds the upkeep foliage; grubs green in shading with three light blue longitudinal stripes; full developed grubs measure 3-4 cm long; eggs are straightened, laid in groups of 10-30; single female lays more than 500 eggs and bring forth in 6-8 days.

***Seat sponsored bother grub, Thosea cervina (Limacodidae: Lepidoptera):***

Larvae eat the leaf tissue on the under surface; serious instances of invasion totally take off the leaves; grown-up moth is dim rosy darker; develop hatchlings are 4 cm long, greenish shading with three dark colored markings; focal checking is saddle molded, other two are look like pear; hatchlings pupate in the dirt; pupae are dull darker, globular and take after tea seeds.

***Vast Faggot worm, Eumeta crameri (Psychidae: Lepidoptera):***

Infest the more seasoned leaves and bark; in the pruned fields, harm will be serious; male moths are rosy dark colored with wings; male moths are ruddy darker with wings; females are without wings and legs; winged guys are mate with grub like females; female lay 500 eggs inside the case; brooding period is 10-15 days; youthful caterpillars build smooth packs, covering with bark and dry twigs; larval span is 9-10 months; before pupation, the sack is suspended from the hedge; hatchling pupated inside the shut sack; male moth develops out yet the female stays inside the pupa.

***Red slug caterpillar, Eterusia aedea virescens (Zygaenidae: Lepidoptera):***

Prefers develop foliage; by extreme assault, the hedge outlines wind up noticeably stripped; grown-up moths are splendidly hued in tints of dark and light yellow; eggs pale white in shading and oval fit as a fiddle; brooding period is 10-12 days; caterpillars take after bother grubs and moves like slug; hatchling is block red shading with six lines of tubercles on the body; hatchling launches a thick liquid through these pores as a protective component, when irritated; five larval instars finished in 4-5 weeks; caterpillar turns a light yellow shading case for pupation; grown-up rise happens following 3 weeks.

***Lobster caterpillar, Neostauropus alternus (Notodontidae: Lepidoptera):***

Commonly observed in new clearings and nurseries; totally eat up every one of the leaves from a little plant; forewings of moths are grayish white with couple of rosy

dark colored spots; eggs are whitish, finely molded and laid in little groups; hatching period is 5-10 days; the dark caterpillars are peculiarly formed and look like dry leaves; larval period is 3-4 weeks; pupated inside a wooly casing; grown-ups develop following 10-14 days;

Cut worm, *Spodoptera litura* (Noctuidae: Lepidoptera): Attack the upkeep foliage; made unpredictable openings on the tea leaves by nourishing; grown-ups have white rear wings; forewings are grayish darker set apart with brilliant lines; eggs laid in groups, brought forth in 3-4 days; hatchlings are dull olive green in shading and encourage for 3 weeks; pupated in the dirt for one week.

**Red borer, *Zeuzera coffeae* (Cossidae: Lepidoptera):**

Usually, youthful stems are drilled by the caterpillars; as the hatchling develops, the passage is additionally expanded; openings are made at interims to discharge the excreta and wood particles; passage may run even up to root; moths have white wings with many dark spots; eggs are laid like dots on a string; caterpillars rise in 10 days; they suspend themselves by smooth strings and get scattered; hatchlings drill into youthful stems; hatchlings burrow downwards, eating up the woody parts, particularly the essence; burrows are stretched out to thicker branches; develop hatchling is around 3.5 cm long and purplish darker or rosy darker in shading; larval term is 4-5 months; pupated in an uncommon load for a month. The influenced branches might be sliced to sound wood. The hatchlings might be slaughtered in situ by pouring a solid arrangement of a bug spray like endosulfan or quinalphos by utilizing an ink filler and stopping the openings.

**Hepialid borer, *Sahyadrassus malabaricus* (Hepialidae: Lepidoptera):**

Young caterpillars drill into the stems; unearth long barrel shaped passages; eating of bark and sapwood brought about ulcers; beat end of the passage opens into blisters; nourishing happens during the evening; it can push ahead and in reverse without breaking a sweat; assaulted shrubs can be effectively situated by the frassy tangle, framed of powdered wood and silk, hanging close to the gaps; they have dark forewings with black out mottling; male deliver sharp, impactful, mustard like smell by the fragrance organs; eggs are communicated by the female in flight; a couple of prevail with regards to burrowing the tea stems; caterpillars made long displays reach out up to roots; develop hatchling is light yellow, pencil thick and 6-10 cm long; Larval span is 10 months; pupated in the lower some portion of the passage; pupal period goes on for 3-5 weeks. Control measures same with respect to red borer.

**Shot gap borer, *Euwallacea fornicatus* (Scolytidae: Coleoptera):**

Female creepy crawlies develop displays in stems; prompts branch breakage and ensuing yield misfortune; grubs and grown-ups feast upon the growth, *Fusarium bugnicourtii* developing in the exhibitions; female insect are dark, 2-2.5 mm long with emphatically sclerotised body; eggs are laid separately inside the exhibition, three larval instars; female lays up to 45 eggs, male female proportion 1:8; populace achieves abnormal states amid April, May, July, October and December; all life stages are seen consistently;

**SHB is overseen in a coordinated route with the accompanying control measures:**

Cultural control (medium sort of pruning in SHB swarmed fields, post prune showering with any of the suggested bug sprays, use of N and K<sub>2</sub>O at 1:2 in the pruned year, evaluation of SHB pervasion level toward the finish of second year or start of third year utilizing the standard examining technique), natural control strategies (mid-cycle control measures in the third and fourth years if the normal rate of invasion in the new wood is at or over 15%, two rounds of entomopathogen splash (*B. bassiana* WP) amid May end, July and October) and compound control (two rounds of prescribed bug spray splashing amid April and December.

**White grub: *Holotrichia* sp. (Melolonthidae: Coleoptera):**

Larvae consume the underlying foundations of youthful plants; now and again they chew the bark of stems close to the ground causing a ring yelping impact; grown-ups are tanish in shading; eggs are saved in the dirt; brooding time frame 12-18 days; larval period is 8-10 months; pupal period goes on for 3 months. Pre warming of nursery soil and check the natural excrement/compost altogether for eggs or grubs or pupae before their application. Expansion of systemic granular bug sprays in the nursery soil; soil utilization of endosulfan 35 EC at the centralization of 1: 500 (20 ml of the compound in 10 l of water); soil around each bramble might be treated with 1 liter of the splash liquid; application may ideally be completed with a dirt injector or soil around the plant relaxed and the weakened concoction must be connected; utilize backpack sprayer in the wake of expelling the spout; application must be rehashed following one month.

**Termites: *Microcerotermes* sp. (Isoptera):**

Damage tea hedges in north-east India while *Glyptotermes dilatatus*, *Neotermes greeni* and *Postelectrotermes militaris* assault tea in Sri Lanka.

***Tea leaf digger, Tropicomyia theae (Agromyzidae: Diptera):***

Leaf mining fly embeds the eggs into the leaves; rising hatchlings make wandering passages on the leaves; larvae are round and hollow, decreasing anteriorly and truncated posteriorly; pupate inside the passage at the leaf edge; formative period is a month.

***Root hitch nematode, Meloidogyne javanica (Heteroderidae: Tylenchida):***

Causes serious annoying of underlying foundations of develop tea hedges; leaves end up noticeably littler in measure, yellowish in appearance, development is hindered; eggs and hatchlings are moderately vast and the stylets are bizarrely long in hatchlings and females. Use of carbofuran 3 G @ 25 g/shrub instantly in the wake of pruning and rehash the application following 3 months. Utilization of neemcake @ 2 kg/hedge is additionally recommended.

**MANAGEMENT:**

Administration of overwhelming whitefly pervasions is exceptionally troublesome. Whiteflies are not very much controlled with any accessible bug sprays. The best procedure is to keep issues from creating in your garden to the degree conceivable. By and large, common foes will give sufficient control of whiteflies; flare-ups may happen if normal adversaries that give natural control of whiteflies are upset by bug spray applications, dusty conditions, or obstruction by ants. Stay away from or expel plants that over and over host high populaces of whiteflies. In gardens, whitefly populaces in the early phases of populace improvement can be held around a careful program of expelling plagued leaves, vacuuming grown-ups, or hosing down (syringing) with water showers. Aluminium thwart or intelligent mulches can repulse whiteflies from vegetable patio nurseries, and sticky traps can be utilized to screen or, at abnormal states, lessen whitefly numbers. In the event that you utilize bug sprays, insecticidal cleansers or oils, for example, neem oil may lessen however not dispose of populaces.

**ORGANIC CONTROL**

Whiteflies have numerous common adversaries, and flare-ups every now and again happen when these characteristic foes have been bothered or wrecked by pesticides, tidy development, or different components. General predators incorporate lacewings, bigeyed bugs, and moment privateer bugs. A few little woman bugs including *Clitostethus arcuatus* (on powder whitefly) and scale predators, for example, *Scymnus* or *Chilocorus* species, and

the Asian diverse woman bug, *Harmonia axyridis*, eat whiteflies. Whiteflies have various normally happening parasites that can be essential in controlling a few animal categories. *Encarsia* spp. parasites are monetarily accessible for discharge in nursery circumstances; notwithstanding, they are not for the most part prescribed for open air utilize on the grounds that they are not very much adjusted for survival in mild zones. An exemption is the utilization of parasite discharges for bayberry whitefly in citrus in southern California. You can assess the level of normal parasitization in your plants by checking void whitefly pupal cases. Those that were parasitized will have round or oval leaf gaps and those from which a solid grown-up whitefly developed will have a T-molded leaf opening. Whitefly fairies can in some cases be checked for parasitization before development by taking note of an obscuring in their shading. Notwithstanding, some whitefly parasites don't turn dark and numerous whitefly sprites that happen on ornamentals are dark in their unparasitized state.

Maintaining a strategic distance from the utilization of bug sprays that slaughter characteristic adversaries is a critical part of whitefly administration. Items containing carbaryl, pyrethroids, diazinon or foliar showers of imidacloprid can be especially troublesome. Control of clean and ants, which shield whiteflies from their characteristic foes, can likewise be vital, particularly in citrus or different trees.

***Tea and Health Benefits:***

It is outstanding that tea is an imperative wellspring of dietary hostile to oxidant. Amid the fabricate of dark tea, monomeric catechin found in green leaves are changed over into dimeric and oligomeric catechins. Studies showed that these dimeric and oligomeric catechins (theaflavins and thearubigens Sharma) are benzotropolone-connected heterodimers or hetero-oligomers of catechins, that are in charge of the trademark shading and taste of dark tea. Theaflavin and thearubigin not just give the substance mark to dark tea however are in charge of the host of medical advantages credited to the utilization of dark tea. The exploration discoveries by Indian Scientists for over two decades on medical advantages of dark tea, especially its capability to battle incessant ailments, has been interesting (Tea Board of India site; and Rao, 2009; Sen and Bera, 2014). Dark Tea has been ascribed with a plenty of tumor preventive activities for over 10 years. The counter cancer-causing action of dark tea was distinguished in tumorigenesis of endodermal and epidermal starting point. It was not just compelling in reestablishing harmony of hostile to oxidant – oxidants in cell milieu, it additionally hinders genotoxicity and synthetic carcinogenesis by adjusting oncogene articulation. It advances apoptosis of tumor cells. Dark tea augmented the statement of proteins required in cell cycle. The part of dark

tea (in any event over four containers) on diminishment of prevalence of human papilloma infection has been captivating and calls for presentation of dark tea in the eating routine of disease patients.

As research facility thinks about have given overpowering confirmations on defensive impact of dark tea in sort 2 diabetes and cardiovascular infections, researcher are presently focusing on epidemiological examinations on part of dark tea as an adjuvant in fighting sort 2 diabetes, dyslipidemia and cardiovascular illnesses. Not exclusively blacks tea have potential mitigating and immunomodulatory activity, it has gastro dynamic and antidiarrhoeal impacts favoring probiotics in intestinal greenery. With changing examples of irresistible sicknesses and the rise of microbial strains impervious to current anti-toxins, dark tea might be a strong antimicrobial specialist to be utilized as adjuvant amid anti-toxin treatment. Late investigations on baby creature display have demonstrated that utilization of dark tea does not apply any poisonous impact and can avert hemolytic paleness related with Indian youth cirrhosis (Mandalet al 2013). Future investigations ought to survey the volume of utilization required for defensive impact of tea amid different illness conditions, bioavailability of the segments and report especially hazard factors known to relate the occurrence of endless sicknesses.

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