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RESEARCH ARTICLE

A FIELD SURVEY OF TEA DISEASES AND THEIR CONTROL MEASURES IN SOME TEA GARDENS OF TERAI REGION, WEST BENGAL, INDIA

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ABSTRACT

A field survey had been carried out from September 2013 to November 2015 in some tea gardens of Terai region, West Bengal. It was found that the Red rust (Leaf and Stem) attack near about 42% of total disease occurrence. Blister blight attack near about 22% , Poria Disease 7%, Brown blight 4%, Black rot 3%, Grey blight 3% , Red root rot 3%, Brown root rot 2%, Violet root rot 2%, Black root rot 1%, Charcoal stump rot 1%, Jew's ear fungus Jew's ear fungus 1%, Thorny blight 1%, Ganoderma 1%, Thorny blight 0.5%, Tarry root rot 0.5%, Purple root rot 0.5% and Nectria 0.5% respectively of total disease occurrence. It was also observed that from last 2 years the Blister blight disease attack is increased approximately double compared to previous years. The tea gardens of that region uses Tea Research Association (TRA) recommended and Tea Board approved fungicides to control them.

INTRODUCTION

Diseases is very problematic in tea plants and can cause death of the bush. Diseases in tea bush are caused by algae, fungi, bacteria, parasite and virus. It also occurred in tea bush due to adverse conditions of soil and climate. Diseases in tea have been classified in two groups:

Primary diseases: The diseases which can cause death of healthy tissues or bushes even under the best conditions is called primary diseases. They have no pre disposing factors (Barthakur, 2002).

Secondary diseases: The diseases which can be harmful if the health of the bushes is damaged due other cause called secondary diseases. They have pre disposing factors (Barthakur, 2002).

MATERIALS AND METHODS

Study Area: The field study was conducted in tea gardens of Terai regions West Bengal, India. Field surveys were conducted in different tea gardens of the study area. The field surveyed tea gardens are Matigara Tea Estate, Dagapur Tea Estate, Sukna Tea Estate, Mohurgong and Gulma Tea Estate, New Chamta Tea Estate, Simulbari Tea Estate, Marionbarrie Tea Estate, Kamalpur Tea Estate, Tirihannah Tea Estate and *Hansqua* Tea Estate.

Data Collection: The presented data were collected during field survey of mentioned tea estates during September 2013 to November 2015. During the field survey different sections of mentioned tea gardens were studied and data collected from the office of the gardens.

RESULT AND DISCUSSION

During the field survey, it was observed that the tea gardens of Terai region mostly affected by Red rust (Leaf and Stem) attack near about 42% of total disease occurrence. Blister blight attack near about 22% , Poria Disease 7%, Brown blight 4%, Black rot 3%, Grey blight 3% , Red root rot 3%, Brown root rot 2%, Violet root rot 2%, Black root rot 1%, Charcoal stump rot 1%, Jew's ear fungus 1%, Thorny blight 1%, Ganoderma 1%, Thorny blight 0.5%, Tarry root rot 0.5%, Purple root rot 0.5%, Nectria 0.5% and 5% other diseases respectively of total disease occurrence. It was observed that from last 2 years the Blister blight disease attack is increased approximately double from previous years. Now a day it is new headache for the tea gardens of Terai region.

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Table-1 Primary diseases (Kabir and Das, 2015)

Site of Attack	Name of the diseases	Causal Organism	Identifying Characters
Leaf	Blister blight	*Exobasidium Vexans*	Upper surface of the leaf develops a swallow depression and the lower surface of the leaf becomes a convex wart which bears grayish white spore during wet weather.
	Black rot	*Corticium invisum* and *Corticium theae*	Leaf apex and margins turns black and the leaf become sodden in rainy season. Small circular brownish warts develop on leaf surface. The dry leaves develop a molting of brown and gray colours. Two or more leaves remain attached with gummy exudation.
Stem	Poria Disease	*Poria hypobrunnea*	Yellowish encrustation forms on the collar region which changing to dull gray, corky. Films of yellowish brown mycelium present beneath the peeled bark. Roots without an encrustation of soil, sand, stone particles and with small yellowish brown cushions or lump. Fruit bodies are found at the base of the big branches.
Root	Nectria	*Nectria cinnabarina*	The stems of the bush die backed and the new shoots which arise lowers down are generally thin and weak. The bush looks like at the point of death.
	Black root rot	*Rosellinia arcuata*	The collar region of the bush without encrustation but with mycelial growth and wooly, grayish stocking of mycelium sometimes extending to the base of the branches. Roots surface with cords or strands of mycelium. Cords cobwebby, black or grayish black, loose or adherent. Star shaped, small, white to black strands of mycelium accompanied by irregular dots and dashes beneath the bark.
	Brown root rot	*Fomes lamaoensis*	The collar region of the bush without encrustation but with mycelial growth and brown soft mycelium extending up the main stem to several inches. Roots with encrustation of soil, sand, stone particles etc. The crust is difficult to remove by washing or rubbing.
	Red root rot	*Poria hypolateritia*	The mycelium cream to brown, general colour of root mottled brown and black. A thin layer of brownish mycelium found beneath the bark. Roots with encrustation of soil, sand, stone particles and mycelium white to chocolate red or black cords or sheets. The crust can be easily removed by rubbing or washing. Thin white films of mycelium present beneath the peeled bark.
	Tarry root rot	*Hypoxylon asarcodes*	The collar region of the bush with black, effused, hard encrustation and surface of crust smooth, dried black point. The wood with dark bands and small reticulations of light brown thin lines.
	Purple root rot	*Helicobasidium compactum*	The collar region of the bush without encrustation but with mycelial growth. Thick pad of velvety, purplish brown mycelium surrounding the collar. Roots with cords or strands of mycelium on the surface. Cords of mycelium purplish brown, cords branched, giving a general purplish brown colour to the root. The woods without bands, reticulations or mycelium and pink to pinkish brown in colour.
	Charcoal stump rot	*Ustulina zonata*	The collar region of the bush without encrustation at first white, then greenish gray and finally black. The surface undulated, brittle and charcoal like when broken. The roots without cords or strands of mycelium on the surface and white or black cushion or lumps on the root. Dull white, silky and fan like film of mycelium present beneath the peeled bark.

Table-2 Secondary diseases (Kabir and Das, 2015)

Site of Attack	Name of the diseases	Causal Organism	Identifying Characters
Leaf	Leaf red rust	*Cephaleorus mycoidae*	Small brownish and circular shaped warts develop on the leaf surface.
	Brown blight	*Colletotrichum camelliae*	Old leaves are generally affected by these diseases. Yellowish green spots developed on young leaves. Circular irregular spots develop on the leaves with red and dray mycelium.
	Grey blight	*Pestalozzia Theae*	Light brown or dark brown, circular or oval shaped patches observed on the leaves. The concentric rings of mycelium are distinctly visible. And on the dorsal surface of leaves fruit bodies are located in concentric rings.
Stem	Stem red rust	*Cephaleuros parasiticus*	Small water soaked green spots and yellow hair appear on green twigs. Twigs harden prematurely forming scaly patches and later it cracks. Circular patches occur on the stems.
	Jew's ear fungus	*Auricularia auricula*	Brown, soft, gelatinous, pronounced bracket like growth resembling to human ears observed at the collar region of the bush. It occurs during rainy season.
	Thorny blight	*Aglaospora aculeata*	Small, black, thorn like, pointed projections singly or in group observed at the collar region of the bush. White strands of mycelium are seen on the surface underneath the bark.
	Ganoderma	*Ganoderma applanatum* and *Ganoderma lucidum*	The collar region of the bush with pronounced bracket like growth. Brackets are thick, dull, upper surface marked with grey and brown concentric zones. The lower surface of brackets dull white.
Root	Violet root rot	*Sphaerostilbe repens*	The roots become inky black or light violate coloured. The smell of dug root vinegary. Leaves of the affected bushes drop off in green condition only. Fruit bodies develop at the collar region of the bush in clusters and resembles to tiny flower buds. Strands of mycelium are irregular, thick, flat, white to orange-purplish brown present beneath the peeled bark. It develops in the water logged area.
	Thorny blight	*Aglaospora sp.*	Small, black, thorn like, pointed projections singly or in group observed at the collar region of the bush. Roots without an encrustation, cushions or lumps and with black pointed thorns, bark raised at base of thorns. Strands of mycelium are black, fern like present beneath the peeled bark.

Table-3 Diseases in tea plants and their control measures in Terai region

Name of the diseases	Fungicides used	Dose
Blister blight	Hexaconazol 5% EC	200ml/200*l* water/acre
	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Bitertanol 25% WP	200g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Black rot	Hexaconazol 5% EC	200ml/200*l* water/acre
	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Poria Disease	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Nectria	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Black root rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Brown root rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Red root rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Tarry root rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Purple root rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Charcoal stump rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Leaf red rust	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Brown blight	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Grey blight	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Stem red rust	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Jew's ear fungus	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Thorny blight	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Ganoderma	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Violet root rot	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre
Thorny blight	Copper Oxychloride 50% WP	350g/200*l* water/acre
	Propiconazole 25% EC	100g/200*l* water/acre
	Carbendazim 50% SC	200ml/200*l* water/acre

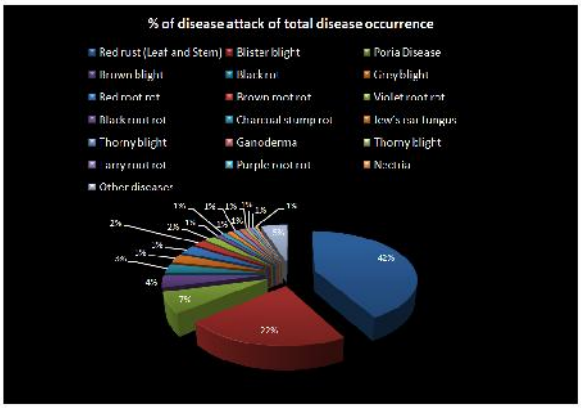

Fig-1 Percentages of disease attack of total disease occurrence

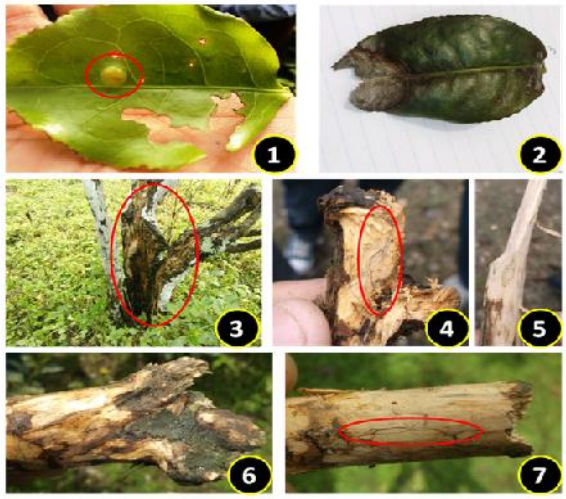

Fig-2: 1. Blister blight, 2. Black rot , 3. Poria disease attacked bush, 4. Red root rot (Chocolate red coloured mycelium), 5. Tarry root rot , 6. Brown root rot (Mycelial growth), 7. Black root rot (Black coloured mycelium).

Fig-3: 8. Leaf red rust, 9. Stem red rust, 10. Brown blight, 11. Grey blight, 12. Jew's ear fungus, 13. Ganoderma .

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