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Biofumigation for Management of Soft Rot in Ginger under Field Conditions

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ABSTRACT

Soft Rot in Ginger caused by Pythium spp. belonging to the kingdom Stramenopila and phyllum Oomycota are of most concern because various species can cause rotting and yield loss on ginger at any of the growth stages including during postharvest storage. The bases of the aerial shoots become soft watery and then rot. The affected plants become pale, the tips of the leaves turn yellow followed by complete yellowing and drying up of the leaves. The present investigaton showed that the biofumigation treatment has been given, only 8.33 % disease infestation with 155.61 q/ha of yield.

Key words: *Biofumigation, Ginger, Pythium, Soft rot etc.*

INTRODUCTION

Ginger (*Zingiber officinale*) is considered as outstanding member of the family Zingiberaceae and attracted considerable attention for its anti-inflammatory, antibacterial and antifungal properties. However, ginger as a crop is also susceptible to different plant pathogens, including viruses, bacteria, fungi and nematodes. Pythium soft rot is the disease of most concern in all ginger-growing regions of the world. *Pythium* spp are of most concern because various species can cause rotting and yield loss on ginger at any of the growth stages including during postharvest storage. *Pythium gracile* was the first species in the genus to be reported as a ginger pathogen, causing Pythium soft rot disease in India in 1907. Thereafter, numerous other *Pythium* spp. have been recorded from ginger growing regions throughout the world. Today, 15 *Pythium* species have been implicated as pathogens of the soft rot disease. Because accurate identification of a pathogen is the cornerstone of effective disease management programs, this review will focus on how to detect, identify and control *Pythium* spp. in general, with special emphasis on *Pythium* spp. associated with soft rot on ginger[2].

The root or underground stem (rhizome) of the ginger plant can be consumed fresh, powdered, dried as a spice, in oil form, or as juice and is commonly produced in India.

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Ginger is available fresh and dried, as ginger extract and ginger oil, and in tinctures, capsules, and lozenges. Foods that contain ginger include gingerbread, cookies, ginger snaps, ginger ale, and a wide variety of savory recipes. From the begining of Krishi Vigyan Kendra, Raigarh, C.G. this institute is committed for improving the agricultural production and income of farmer. In ginger, from last few years, rhizome rot in ginger has became the endemic disease in this district, resulting in the drastic reduction on cultivation of this spices. Thus, looking in to this problem of farmer's, KVK along with it's team has thorougly visited the affected field and diagnose the problem and finally decided to do the Onfarm trial (OFT) to control the rhizome rot. For this purpose, village Hamirpur of Tamnar block located about 27 km away from KVK, Raigarh.

The bases of the aerial shoots become soft watery and then rot. The affected plants become pale, the tips of the leaves turn yellow followed by complete yellowing and drying up of the leaves. The shoots fall and cease to produce rhizomes. The infection extends of the rhizomes. The inner tissues being reduced to a soft and black. Losses can be high. The disease is favoured by high moisture content of the soil with insufficient drainage.

MATERIAL AND METHODS

The present investigation has been conducted at village Hamirpur, block Tamanar, district Raigarh, KVK Raigarh (C.G.). For control of rhizome rot, line of treatment followed was use of mancozeb and metalaxyl @ 1.25 gm/L/kg seed. Along with ginger seed sowing, seeds of mustard were also sown simultaneously, so at to use it as biofumigant. During first earthing, mustard crop were mulched properly so that fumed of the mustard can prevent the growth of *Pithium sp.*, a fungus responsible for rotting of rhizome.

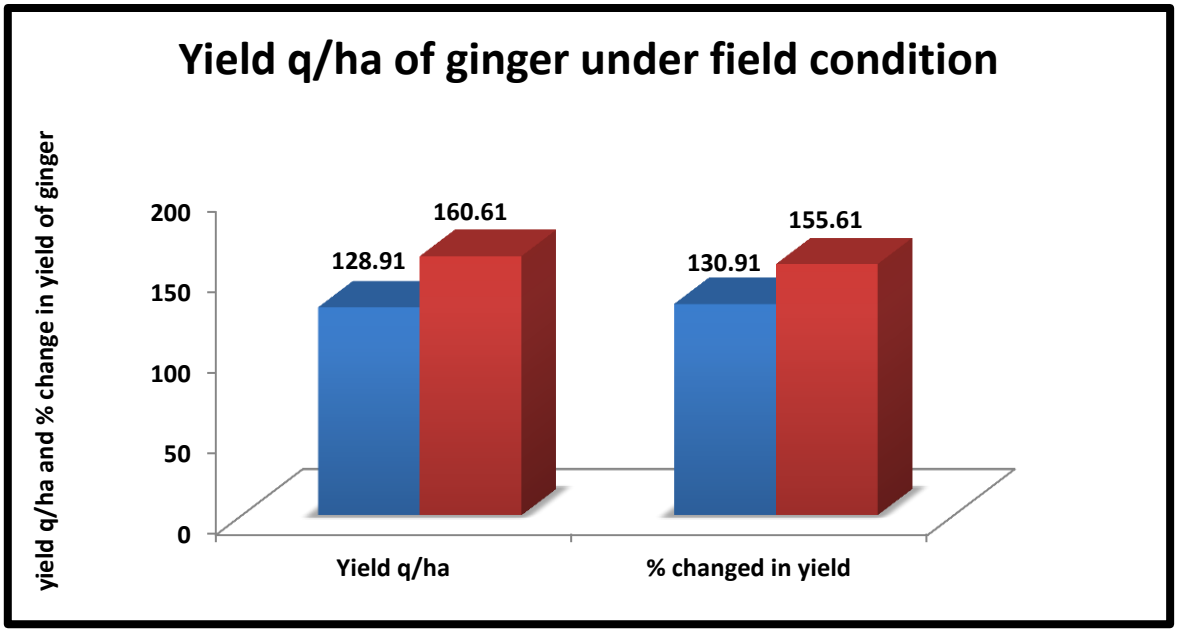
RESULT AND DISCUSSION

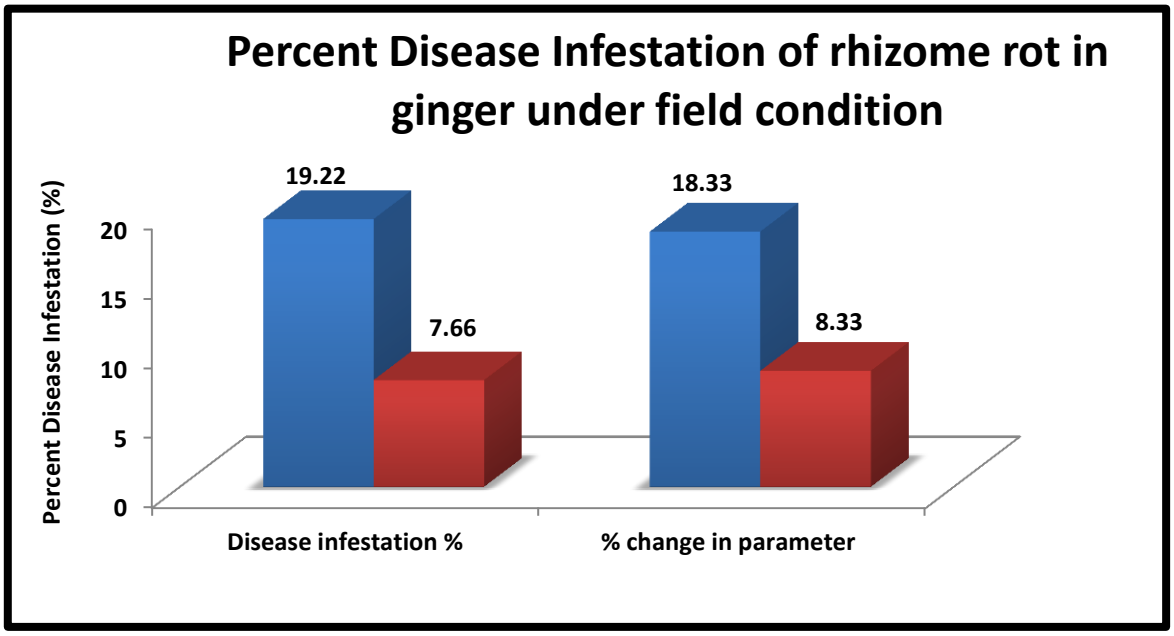
In this trial, on the control field, infestation of 18.33 % was reported, yielding 130.91q/ha, with B: C ratio of 1.58. However, in the field, where the treatment has been given, only 8.33 % infestation was found, yielding 155.61q/ha, with B: C of 1.80. Thus, this technology may proved to be a very much useful for control of this disease causing huge losses to the ginger growing farmers. Our results are in conformity with Bandyopadhyay and Khalko[1] who found that soil biofumigation with cabbage plant residues has suppressed the soil borne pathogens (bacterial wilt disease) significantly. Regarding disease management, it is clear that biofumigation using cabbage was the best treatment as it produced the lowest bacterial wilt disease of ginger (5.92%). Our result is also in accordance with the results of Ojaghian *et al.*[4] who found that Brassica crops used as green manure cover crops were able to significantly reduce potato stem rot caused by *Sclerotinia sclerotiorum* in field tests. Similar result with biofumigation was also recorded by Neubauer *et al.*[3] who found that amendments of *Brassica juncea* shoot tissue reduced the number of viable microsclerotia of *Verticillium dahliae* significantly with efficiencies from 69.3 to 81.3%. similarly, Wang *et al*.[5] also reported that biofumigation with rapeseed (Brassica napus 'Dwarf Essex') meal and chemical fumigation with dazomet were tested to control the pepper disease caused by *Phytophthora capsici*.

Table 1: Yield and Percent Disease Infestation of rhizome rot in ginger under field condition

Sr. no.	Yield q/ha		% changed in yield		Disease infestation %		% change in parameter		Net Income Rs/ha	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
T1	128.91	130.91	24.5	18.86	19.22	18.33	60	54.55	444550	231820
T2	160.61	155.61			07.66	8.33			59050	346655

*T1: Control, T2: Treated





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