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Short Communication

Influence of plant spacing, seed rhizome size and cultivars on the incidence of rhizome rot and wilt disease complex of ginger

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Rhizome rot and wilt disease complex is the important production constraints of ginger cultivation in hill agro-ecological region of West Bengal. In the present study, attempt have been made to manage the problem by adjusting plant spacing, seed rhizome size and as well as by selection of suitable cultivars available in the region. Plant spacing of 25 × 30 cm was found to be optimum for better crop return and lower disease incidence. Considering both lower percentage disease incidence and higher yield, seed rhizome size of 50 to 75 g was found to be optimum for ginger planting. Mother rhizome extraction/removal that is, the common practice followed by ginger growers in the region had an additive effect on incidence of rhizome rot and wilt disease complex of ginger. None of the locally available germplasm tested was found to be tolerant against rhizome rot and wilt disease complex of ginger, however, cultivar "Majauley" may be considered as moderately susceptible and "Bhaisey" and "Gorubathaney" are considered as highly susceptible germplasm.

Key words: Ginger, rhizome rot, wilt disease, West Bengal, seed.

INTRODUCTION

Ginger (*Zingiber officinale* Rose) is an important commercial spice crop grown for its aromatic rhizomes, which are used both as a spice and medicine. At present, India is the largest producer of ginger in the world accounting for about one-third of the total world output followed by Thailand and Japan. In India, about 80.71 thousand hectares of land is under ginger cultivation with a total production of 284.22 thousand tonnes (Shanmugavelu et al., 2002). Ginger ranks in top order among the major spices grown in West Bengal and its cultivation is mostly confined to Terai and hilly zone. In West Bengal, about 8.01 thousands hectare of land is under ginger cultivation with a production of 16.66 thousands tones (Shanmugavelu et al., 2002) of which hilly region of Darjeeling district occupies about 1.1 thousands hectare of land with a total production of 9.68 thousand tonnes (Anonymous, 1982). The yield of ginger has been reported to vary greatly depending on cultivars, climate, planting time and maturity at harvest (Peter et al., 2005). Diseases are important production constraints of ginger and often associated with *Ralstonia solanacearum*, *Pythium* spp., *Fusarium oxysporum* and *Pratylenchus coffeae* (Rajan et al., 2002). The crop suffers from several diseases among them bacterial wilt (*R. solanacearum*) is a serious problem in Kerala and North-East region of the country especially in Sikkim and West Bengal (Sarma and Anandaraj, 2000). In India, this disease complex is prevalent in most of the ginger growing areas and is responsible for losses to the extent of 50% or more (Joshi and Sharma, 1982). A successful management strategy is yet to be formulated to combat this complex disease problem. Therefore, in the present study an attempt have been made to manage the problem by adjusting plant spacing, seed rhizome size and as well as by selection of suitable cultivars available in the region.

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Table 1. Effect of different plant spacing on rhizome rot and wilt disease complex incidence and yield of ginger.

Treatment	Treatment particular (spacing in cm)	Disease incidence (%)	Yield (in t/ha)
T_1	15 ×15	59.6	23.7
T_2	15×20	59.1	21.2
T_3	15×25	51.7	29.7
T_4	20×20	53.1	32.2
T_5	20×25	48.9	40.6
T_6	20×30	43.2	48.1
T_7	25×25	45.1	45.9
T_8	25×30	37.2	57.5
T_9	30×30	35.6	55.8
	SEM (±)	1.974	1.583
	C.D. (p=0.05)	5.918	4.745

Table 2. Effect of different seed rhizome size of ginger on rhizome rot and wilt disease comple× and yield of ginger.

Treatment	Treatment particular (in gm)	Disease incidence (%)	Yield (t/ha)
T_1	25	36.90	44.5
T_2	50	38.23	51.8
T_3	75	40.10	54.2
T_4	100	42.70	50.6
T_5	125	45.20	45.2
T_6	150 (with mother rhizome removal)	70.20	4.5
	SEm (±)	3.014	1.241
	C.D. (p=0.05)	9.50	3.74

MATERIALS AND METHODS

The field experiment was carried out during the year 2005 at RRS (Hill zone), Uttar Banga Krishi Viswavidyalaya, Kalimpong, to study the influence of plant spacing, seed rhizome size and different local cultivars on the incidence of rhizome rot and wilt disease comple× of ginger. The planting was done in raised beds of about 1 feet height. All normal agronomic practices were followed during the course of investigation. In case of spacing trial, nine different plant spacing (15×15, 15×20, 15×25, 20×20, 20×25, 20×30, 25×25, 25×30 and 30×30 cm) with three replications were tried. For experiment on effect of seed rhizome size, si× different size of seed rhizome (25, 50, 75, 100, 125 and 150 g) with four replications were used. Here, in case of 150 gm seed rhizome size, mother rhizome extraction/removal, a common practice followed by the ginger grower in the hills was also adopted. Four locally available cultivars (Gorubathaney, Bhaisey, Majauley and Nagrey) with si× replications were used for the screening against rhizome rot and wilt disease comple× of ginger. The experiments were laid out in a randomized block design with a plot size of 3.0 m^2 in all the three experiments. Observations in respect of disease incidence were recorded periodically at monthly intervals and the yield data was taken at harvest.

RESULTS AND DISCUSSION

Different plant spacing showed differential disease incidence and the differences were found to be statistically significant (Table 1). Maximum disease incidence (59.60%) was noted in 15×15 cm plant spacing and was statistically at par with 15×20 cm plant spacing and minimum in 30×30 cm plant spacing (35.60%), statistically at par with 25×30 cm plant spacing. It was also observed that with decreasing plant spacing there was a significant increase in percent disease incidence. Furthermore, it was also noted that 5 cm difference in row spacing had no significant difference in disease incidence, while 10 cm gaps in row spacing showed significant difference in disease incidence. Maximum yield was obtained in wider spacing of 25×30 cm that was statistically at par with 30×30 cm plant spacing while minimum yield was obtained in closer spacing of 15×20 cm. Thus, from the present investigation it may be concluded that 25×30 cm plant spacing was found to be optimum for better crop return and lower disease incidence.

Planting of different size of rhizome pieces (on weight basis) produced different degree of disease incidence and rhizome yield in ginger. But the differences in disease incidence percentage were not statistically significant except in case of farmers' practice (T_6) (Table 2). Lowest disease incidence (36.9%) was observed when planting was made with 25 g seed rhizome and highest

Table 3. Screening of different cultivars against rhizome rots and wilt disease comple× of ginger.

Treatment (cultivar)	Average disease incidence in different month (%)				Final average disease incidence (%)
	June	July	August	September	
Gorubathaney	5.66	19.16	50.60	63.90	63.9
Bhaisey	7.99	26.12	58.20	76.60	76.6
Majauley	1.58	14.70	39.90	46.80	46.8
Nangrey	3.23	19.11	45.20	52.50	52.5
SEm (±)					2.68
C.D. (p=0.05)					8.07

rhizome yield was observed when planting was made with 75 g seed rhizome. Thus, from the present investigation it can be concluded that considering both the lower percentage of disease incidence and higher yield, 50 - 75 g seed rhizome size was found to be optimum for ginger planting. It was also observed that extraction or removal of mother rhizome as practiced by the farmers had an additive effect on incidence of rhizome rot and wilt disease comple× of ginger.

Four cultivars including, Bhaisey, Gorubathaney, Majauley and Nagrey were screened in pathogen conducive plot for disease development and their progression in different months to find out suitable ones for lower disease incidence and higher crop return in hill agro-ecological region. The perusal of the data presented in Table 3 indicated that the disease initiated in the month of June and reached its maximum outbreak during August-September. The progress of disease was comparatively faster in cultivar “Bhaisey” and “Gorubathaney”. Lowest disease incidence percentage was obtained in cultivar “Majauley” (46.80%) followed by “Nangrey” (52.4%). None of the germplasm however was found to be tolerant against rhizome rot and wilt disease comple× of ginger whereas cultivar “Majauley” may be considered as moderately susceptible and Bhaisey and Gorubathaney are considered as highly susceptible germplasm.

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