Himachal Journal of Agricultural Research Vol. 32(2) : 29-32, 2006

Effect of different shading crops on growth, yield and economics of ginger (*Zingiber officinale* Rose.)

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Abstract

A field experiment was conducted during the growing seasons of 1999-2000, 2000-01 and 2001-02 to study the effect of different shading crops on yield, economics and rhizome rot incidence of ginger at Dhaulakuan. The crop sown with single row of maize as a shading crop gave significantly highest number of tillers and rhizomes/ plant, ginger equivalent yield and net returns/ hectare. The highest plant height and lowest rhizome rot incidence was recorded with two rows of *Cajanus cajan* as a shading crop. Shading crops resulted in less rhizome rot incidence compared to control i.e. no shading.

Key words: Ginger, maize, pigeon pea, turmeric, shading crops.

Introduction

Ginger (*Zingiber officinale* Rose.) is an important cash crop for the small and marginal farmers of low and mid hill areas of Himachal Pradesh. Sirmour District alone contributes about two thirds of total production in the state. Rhizome rot incidence and poor adoption of improved production technology have resulted in drastic reduction in area, production and productivity of ginger during nineties. Effective management technology i.e. involving selection of healthy seed, nutrient management, seed treatment and life mulching play vital role in raising the healthy crop (Bisen and Barhollia, 1989 and Korla and Dohroo, 1991). Studies conducted in India and elsewhere revealed that ginger is shade tolerant/loving crop (Jayachandran *et al.*, 1991 and Ravisankar and Muthusawamy, 1987). Information is available on effect of nutrient management and seed treatment on rhizome rot incidence and yield but its meager for life mulching (shading crop). The present investigation was, therefore, undertaken to assess the impact of different shading crops on ginger under low hill sub-montane areas of Himachal Pradesh.

Material and Methods

The experiment consisting of 8 treatments viz. pigeon pea (*Cajanus cajan*) single and double row, maize (*Zea mays*) single and double row, turmeric (*Curcuma langa*) single and double row, farmers practice (mix cropping of ginger with local crops) and no shading was laid out in randomized block design with three replication at the experimental farm of Hill Agricultural Research and Extension Centre, Dhaulakuan, Sirmour. The soil of the experimental site was sandy loam in texture with neutral pH, medium available N, high available P and low available K. The sowing was done in the Ist week of June during the experimentation of every year in a planting geometry 30cm x20cm (ginger) and shading crop was planted lengthwise after every four rows of ginger with recommended package of practices. The crop was harvested during Ist week of February. Shading crop was planted along with ginger as per the treatments and harvested after the maturity. The centre has sub tropical type of climate and total amount of rainfall received during the crop season (May to January) during 1999-2000, 2000-2001and 2001-2002 was 1809.8, 1188.4 and 1411.6 mm, respectively (Table-1).

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Table 1. Rainfall data recorded at Dhaulakuan

Month	Rainfall (mm)		
	1999-2000	2000-2001	2001-2002
May	28.9	109.7	118.1
June	271.0	375.6	200.7
July	636.4	470.8	623.9
August	454.0	190.1	411.7
September	381.2	31.2	7.2
October	Nil	Nil	Nil
November	Nil	Nil	3.0
December	Nil	Nil	4.0
January	38.3	11.0	43.0
Total	1809.8	1188.4	1411.6

Results and Discussion

Effect of shading on growth parameters and yield attributes

Shading crops significantly influenced the plant height, number of tillers and rhizomes/ plant (Table 2). Ginger crop sown with double rows of pigeon pea as a shading crop resulted in significantly highest plant height (59.1 cm) followed by pigeon pea shading (single row). Maize shading (single and double rows) recorded medium plant height (50.1 and 52.4 cm) but significantly higher compared to single and double rows of turmeric shading (42.8 and 44.6 cm), farmer's practices (42.6 cm) and no shading (42.3

Table 2. Effect of various treatments on growth and yield attributes of ginger (Mean data of 3 years from 1999-2000 to 2001-02)

Treatment	Germination (%)	Plant height (cm)	No. of tillers/ plant	No. of rhizomes/ plant
Pigeon pea (SR)*	89.0	54.5	7.4	7.1
Maize (SR)	87.0	50.1	10.9	10.3
Turmeric (SR)	85.3	42.8	5.4	5.9
Pigeon pea (DR)**	85.0	59.1	6.7	6.8
Maize (DR)	87.3	52.4	9.5	8.9
Turmeric (DR)	84.7	44.6	4.9	5.3
Farmer's practice	80.3	42.6	4.6	4.9
No shading	80.7	42.3	5.3	5.9
C D (P=0.05)	NS	5.6	1.2	1.3

(* Single row, ** Double row)

cm). Lowest plant height of ginger was obtained with control i.e. no shading. Maize shading (SR) resulted in maximum number of tillers and rhizomes/ plant followed by maize shading (DR). Pigeon pea shading (SR) produced significantly more number of tillers and rhizomes/ plant compared to pigeon pea shading (DR), turmeric shading (SR and DR), farmer's practice and no shading. Lowest number of tillers and rhizomes/ plant was recoded with farmer's practice. This indicates that maize shading facilitates proper growth and development condition of ginger as compared to other shading crops and farmer' practices owing to favourable change in microclimate.

Effect on yield and economics

Shading crops significantly affected ginger yield (Table-3). Mean data of 3 seasons showed that ginger crop sown with single row of maize shading resulted in significantly highest ginger equivalent yield (129.5 q/ ha) followed by double rows of maize shading. It may be due to the better growing conditions and higher number of tillers and rhizomes/ plant of ginger under maize shading (SR). However, there was not significant difference in the ginger equivalent yield obtained from maize shading (DR), turmeric shading (SR), pigeon pea shading (SR) and pigeon pea shading (DR). Lowest ginger equivalent yield (74.4 q/ ha) was recorded with farmer's practice. However, difference in ginger equivalent yield between farmer's practice and control (no shading) was not found significant. The lowest ginger equivalent yield in farmer' practices may be due to the poor growing conditions. Panigrahi and Patro (1985) also reported the beneficial effects of shading in ginger. Highest gross (Rs 194250.0) and net returns (Rs 101112.0) per hectares were recorded in single row shading of maize followed by double rows of maize shading (Rs 157650.0 and Rs 77438.0/ ha). Farmer's practice resulted in lowest gross and net returns per hectare (Rs 111600 and Rs 14070.0/ ha). Higher returns in single row shading of maize may be due to the better yield and less cost of cultivation.

Effect on rhizome rot incidence

Rhizome rot incidence was comparatively less in all the shading treatment but it did not differ significantly. (Table 3). The lowest rhizome rot incidence was recorded with the double rows of pigeon pea shading. No shading (control) resulted in maximum rhizome rot incidence compared to shading treatments.

Thus, the results of the three year study clearly indicated that sowing of ginger with maize as a shading crop (single row) may be beneficial in improving the production and raising of healthy ginger crop.

Table 3. Effect of various treatments on yield, economics and rhizome rot incidence of ginger (Mean data of 3 years from 1999-2000 to 2001-02)

Treatment	Yield (q/ ha)			Economics (Rs/ha)			Rhizome incidence (%)
	Ginger	Shading crop	Ginger equivalent	Total cost	Gross returns	Net returns	
Pigeon pea (SR)*	96.2	6.2	102.4	92216.0	153600.0	61384.0	7.9
Maize (SR)	124.3	16.9	129.5	93138.0	194250.0	101112.0	8.5
Turmeric (SR)	89.2	55.6	105.0	104238.0	157500.0	53262.0	8.1
Pigeon pea (DR)**	86.7	9.9	98.2	79390.0	147300.0	67910.0	7.7
Maize (DR)	97.7	23.8	105.1	80212.0	157650.0	77438.0	8.3
Turmeric (DR)	52.7	89.5	82.0	101212.0	123000.0	21788.0	9.3
Farmer's practice	71.3	10.5	74.4	97530.0	111600.0	14070.0	10.2
No shading	79.2	-	79.2	89954.0	118800.0	28846.0	12.8
C D (P=0.05)	-	-	9.9	-	-	-	NS

(* Single row, ** Double row)

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