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RESEARCH ARTICLE

RELAY INTERCROPPING OF DIFFERENT GOURDS WITH BRINJAL IN CHARLAND AREA

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ABSTRACT

A field experiment was conducted to find out the suitable combination of relay intercropping of different gourds with brinjal for higher productivity and economic return at the Regional Agricultural Research Station, Jamalpur during rabi and kharif 2017-2018 and 2018-2019. The experiment was laid out in randomized complete block design (RCBD) with three replications and seven treatments. The treatments were T_1= Sole brinjal, T_2= Brinjal + relay sweet gourd, T_3= Brinjal + relay ridge gourd, T_4= Brinjal + relay bitter gourd, T_5= Brinjal+ relay sponge gourd, T_6= Brinjal + relay snake gourd, T_7= Brinjal + relay ash gourd. Highest brinjal yield was observed in relaying snake gourd and sweet gourd combination (Y_1 and Y_2) which was statistically similar to sole brinjal and brinjal + relay ash gourd combination.

KEYWORDS

Relay intercropping, gourds, brinjal, charland area.

1. INTRODUCTION

Bangladesh is one of the major Horticultural countries in South Asia (Ali, 2000). Brinjal (*Solanummelongena* L.) is an important vegetable for its commercial and nutritional value in the world as well as in Bangladesh. "Begoon" (Brinjal or Eggplant) is a very common and favorite vegetable in Bangladesh which has a link with the social, cultural and economic lives of rural people. Relay cropping is one of most reliable and applicable practices including a complex suite of different resource-efficient technologies. Relay cropping is a method of multiple cropping where one crop is seeded into standing second crop well before harvesting of second crop (Queen et al., 2009). Relay cropping possesses the capability to improve soil quality, to increase net return and land equivalent ratio, and to control the weeds and pest infestation, thereby decreasing chemical pest control measures (Jabbar et al., 2011; Bandyopadhyay et al., 2016).

Relay cropping facilitates the farmers to cultivate two crops in 1 year especially in those areas/cropping systems where growing season is shrinking for sequential farming due to climate change (Akanvou et al., 2002; Reda et al., 2005; Zhang et al., 2007a; Jabbar et al., 2010). Other environmental benefits associated with relay cropping include improved soil, air, and water quality by reducing the leaching, emanations, and eutrophication of nutrient compounds (Jabbar et al., 2005). Relay cropping has still been recognized, especially by smallholder farmers, because of its potential to increase land use efficiency and reduce fertilizer consumption, enhance crop yield and nutrient accumulation, and improve biological activities (Ayisi et al., 1997; Ghosh et al., 2006). Relay cropping is proposed as a beneficial tool that results in better utilization of residual soil moisture from previous crops and reduces cost of production per unit area with efficient utilization of natural resources (Jabbar et al., 2005).

Brinjal is the most important crop in area and production in Bangladesh especially in char area. In Bangladesh, there are about 0.82 million hectares of char land (Ahmed et al., 1987). "Charland" is the Bengali term, its English meaning is "Riverine Island" for mid-channel island that emerges periodically from riverbed as a consequence of accretion (Elahi, 1991). In Bangladesh the *char* lands can be divided into five sub areas which has highly potential for groundnut production (The Jamuna, the Ganges, The Padma, The upper Meghna and the lower Meghna River) where Tista and old Brahmaputra also constitute some *char* land areas (Islam et al., 2012). Jamalpur district which most brinjal production area of Bangladesh 6987 acres area produced 25449 MT (BBS, 2016). Farmers of this area practiced relay intercropping of different gourds with brinjal. But they do not know suitable combination of relay intercropping of different gourds with brinjal. In this case the experiment was undertaken to find out the suitable combination of relay intercropping of different gourds with brinjal for higher productivity and economic return.

2. MATERIALS AND METHODS

The district lies between 24°34′ and 25°26′ north latitudes and between 89°40′ and 90°12′ east longitudes and it is situated at elevation 23 meters above sea level (Pal, 2012). The annual average temperature of this district varies from maximum 36.63°C to minimum 9.4°C. Annual average rainfall is 933.7 mm (Regional Research Report, 2018-19). The experimental site was of medium high land belonging to the agro-ecological zone Old Brahmaputra Floodplain under Agro-Ecological Zone 9 (UNDP-FAO, 1988). The experiment was conducted at the Regional Agricultural

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Research Station, Jamalpur during *rabi and kharif* 2017-18 and 2018-19 to find out the suitable combination of relay intercropping of different gourds with brinjal for higher productivity and economic return. Design of the experiment was RCB with 03 replications having the unit of plot size 3.2m × 3.5m. Brinjal: local, Sweet gourd: local, Ridge gourd: BARI Jinga -1, Bitter gourd: local, Sponge gourd: BARI dundul -1, Snake gourd: BARI Chichinja-1, Ash gourd: local were used as a variety in the experiment.

Treatments included in the experiment were: T_1= Sole brinjal, T_2= Brinjal + relay sweet gourd, T_3= Brinjal + relay ridge gourd, T_4= Brinjal + relay bitter gourd, T_5= Brinjal+ relay sponge gourd, T_6= Brinjal + relay snake gourd, T_7= Brinjal + relay ash gourd. Fertilizers were applied for sole brinjal 80-24-60-10-1.0-0.3 and all gourds 50-24-40-14-1-0.7 kg/ha N-P-K-S-Zn-B fertilizers were applied in the form of Urea, triple super phosphate, Muriate of potash, Zypsum, Zinc Sulphate and Boric acid respectively (FRG, 2012). For sole brinjal: Half cowdung should be applied during the final land preparation. Remaining cowdung and full amount of phosphorus, sulphur, zinc and boron should be applied in three equal splits 21, 35 and 50 days after transplanting. Brinjal transplanted on November 08, 2017 and November 04, 2018. All gourds were transplanted on April 04, 2017 and April 18, 2019. Intercultural operations like watering, weeding and spraying insecticides were followed as and when necessary. One pheromone trap was used for every one decimal land to control of brinjal fruit and shoot borer. Irrigation was applied two times during the growing period brinjal and relay gourds grown when necessary. Yield of brinjal and gourds were calculated in t ha^{-1} considering the whole plot harvest area. Five plants of brinjal in each plot were selected randomly to collect data on yield components. Collected data were analyzed statistically with the help of STAR software and mean separation was done as per LSD test at 5% level of significance.

3. Results and Discussion

3.1 Brinjal component

Yield and yield components except fruit length and fruit breadth, plant height, single fruit weight and yield differed significantly influenced by different relay intercropping system (Table 1). The highest plant height was found in brinjal + relay sponge gourd combination (Y_1 and Y_2) because of less competition between brinjal and sponge gourd plants. Single fruit weight highest was obtained from brinjal + relay ash gourd combination (Y_1 and Y_2) may be closer space of ash gourd leaf. The highest yield was observed in brinjal + relay snake gourd combination which was statistically similar to sole brinjal and brinjal + relay ash gourd combination (Y_1) and in (Y_2) Brinjal + relay sweet gourd combination performed higher yield.

Table 1: Yield and yield components of brinjal in relay intercropping (Jamalpur 2017-18 and 2018-19)

Treatment combination	Plant height(cm)		Single fruit wt.(gm)		Fruit length (cm)		Fruit breadth (cm)		Yield (t/ha)	
	Y_1	Y_2	Y_1	Y_2	Y_1	Y_2	Y_1	Y_2	Y_1	Y_2
T_1	84.57	83.8	52.67	42.2	9.73	6.5	3.48	2.31	20.05	13.5
T_2	84.46	83.5	56	44.3	9.49	5.9	3.38	2.1	18.62	13.7
T_3	84.57	82.9	53	46.2	9.5	6.0	3.58	2.32	18.54	12.4
T_4	85.83	84.8	52	41.5	9.62	5.9	3.35	2.0	18.62	11.0
T_5	86.12	85.2	54.67	47.2	9.99	7.0	3.49	2.5	16.21	10.5
T_6	82.63	81.6	64.33	57.1	10.4	8.1	3.58	2.4	21.7	12.1
T_7	80.86	80.1	74.67	62.1	10.33	7.5	3.53	2.6	20.31	12.2
$LSD_{0.05}$	4.92	5.31	7.99	9.55	-	-	-	-	2.39	8.9
CV (%)	2.05	3.11	4.81	5.8	4.54	6.8	5.43	7.89	4.37	6.2

T_1= Sole brinjal, T_2= Brinjal + relay sweet gourd, T_3= Brinjal + relay ridge gourd, T_4= Brinjal + relay bitter gourd, T_5= Brinjal+ relay sponge gourd, T_6= Brinjal + relay snake gourd, T_7= Brinjal + relay ash gourd; Y_1 = 1st Year and Y_2 = 2nd Year

3.2 Gourds yield

Yield differed by different gourds in brinjal relay intercropping system. The highest yield was found in brinjal + relay ash gourd combination (Y_1 and Y_2). Sequentially high yield was found in relay sweet gourd, relay snake gourd, relay sponge gourd, relay bitter gourd and relay ridge gourd combination. Yield was satisfactory which found additionally within a short duration of relaying crop.

Table 2: Yield of different gourds in brinjal relay intercropping (Jamalpur 2017-18 and 2018-19)

Treatment combination	Yield (t/ha), 2017-18	Yield (t/ha), 2018-19
Sole brinjal	-	-
Brinjal + relay sweet gourd	12.9	6.5
Brinjal + relay ridge gourd	4.29	5.7
Brinjal + relay bitter gourd	7.2	3.1
Brinjal+ relay sponge gourd	7.82	4.3
Brinjal + relay snake gourd	10.14	4.3
Brinjal + relay ash gourd	13.92	8.9

4. Conclusion

The highest brinjal yield was observed in relaying snake gourd and sweet gourd combination (Y_1 and Y_2) which was statistically similar to sole brinjal and brinjal + relay ash gourd combination. In relaying intercropping sysytem different gourds yield was performed satisfactory, less cost and less total duration time.

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