

INTERCROPPING OF WHEAT IN POTATO

M.S.U. Bhuiya, S.M.A. Hossain, M.A. Islam and M.A. Hoque

Department of Agronomy, Bangladesh Agricultural University, Mymensingh, Bangladesh

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An experiment was carried out at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh from December 1985 to April 1986 to determine the productivity of wheat potato intercropping at different planting arrangements. The spacings maintained between rows of potato were 40 x 25 cm; 50 x 25 cm; 60 x 25 cm and 70 x 25 cm where wheat was cultivated as intercrop. The results showed that the Income Equivalent Ratio (IER) was higher in all the treatments indicating the profitability of intercropping. Planting arrangement of potato having 50 x 25 cm + wheat appeared to be the best combination.

Key words: Wheat, Potato, Intercrop.

INTRODUCTION

Intercropping involves the growing of two or more crops simultaneously on the same piece of land in different but proximate stands. By planting more than one crop in the same land area, the crop grower can maximize soil moisture, maintain soil fertility and minimize soil erosion which are serious drawbacks of monoculture [6]. Intercropping is one of the peasant's farming systems in the tropics and also in Bangladesh. It is a practice characterized by minimum utilization of inputs such as fertilizers, water, and insecticides. The types and choice of crops grown under intercropping systems are normally governed by physical, chemical and social factors.

In Bangladesh, there is great possibility of intercropping in rabi season (October to March). Many farmers practise mixed cropping of pulses with other crops, like wheat, mustard and sugarcane. But little information is available on intercropping practices of potato with wheat. The plant stature of potato is short while that of wheat is tall. Physiologically there may be good combination of wheat and potato crop mixture. Generally potato crop requires comparatively higher inputs in terms of its cultural requirement which involve higher cost. The cost may be minimized if another crop can be raised between the rows of potato crop without affecting its yield and total return.

The present study was, therefore, undertaken to determine the productivity of potato - wheat intercropping with different planting arrangements.

MATERIALS AND METHODS

The experiment was carried out at the Agronomy Field Laboratory, Bangladesh Agricultural University,

Mymensingh during December 1985 to April 1986. The study consisted of the following treatments :

1. Potato only (40 x 25 cm)
2. Potato only (50 x 25 cm)
3. Potato only (60 x 25 cm)
4. Potato only (70 x 25 cm)
5. Potato (40 x 25 cm) + Wheat
6. Potato (50 x 25 cm) + Wheat
7. Potato (60 x 25 cm) + Wheat
8. Potato (70 x 25 cm) + Wheat
9. Wheat only (25 cm apart rows)

The experiment was laid out in a randomized block design with four replications. The unit plot size was 5 x 3 m. Potato CV. Diamant and wheat CV. Pavan were included as the experimental crops. The fertilizer dose used was 234 Kg N, 243 Kg P₂O₅ and 180 kg K₂O per ha. for the potato crop alone and potato intercropping. But for wheat crop alone, the fertilizer was applied at the rate of 90 kg N and 70 Kg P₂O₅ per ha. In the plots the fertilizers were applied at the time of final land preparation as urea, triple superphosphate and muriate of potash. In a single row 20 whole potato seeds having 30-40 mm dia. were planted on 11 December, 1985. Plant spacings within the row were maintained. In between two potato rows wheat seeds were sown at the rate of 100 kg per ha. on the same day. Weeding and earthing-up (raising up of soil along the rows) was done wherever necessary 35 days after planting. One flood irrigation was given 38 days after planting. Potato was harvested on 10 March and wheat on 8 April 1986.

The yields of protein, carbohydrate, edible food and dry matter of edible food were calculated from the agronomic yield by using the conversion table as used by Christian Reformed World Relief Committee [3]. The data

collected were analysed statistically. The mean differences were adjudged by Duncan's Multiple Range Test.

To evaluate the productivity advantages of the intercrops, IER (Income Equivalent Ratio) was calculated as follows [4].

$$\text{IER} = \frac{\text{Income from intercrop potato}}{\text{Income from sole crop potato}} + \frac{\text{Income from intercrop wheat}}{\text{Income from sole crop wheat}}$$

RESULTS AND DISCUSSIONS

In the present study spacings between two potato rows were used for growing wheat and the performance of potato – wheat intercropping was evaluated.

Spacing as well as intercropping had a marked effect on potato yield. From Table 1, it was observed that potato

Table 1. Yield of potato and wheat as sole crop and intercropping

Planting arrangement	Yield t/ha		Relative yield (%)	
	Potato	Wheat	Potato	Wheat
Potato only (40 x 25 cm)	30.73	—	1.00	—
Potato only (50 x 25 cm)	28.57	—	1.00	—
Potato only (60 x 25 cm)	27.58	—	1.00	—
Potato only (70 x 25 cm)	22.36	—	1.00	—
Potato (40 x 25 cm) + Wheat	21.98	1.43	0.72	0.58
Potato (50 x 25 cm) + Wheat	22.98	1.64	0.80	0.67
Potato (60 x 25 cm) + Wheat	22.74	1.46	0.82	0.60
Potato (70 x 25 cm) + Wheat	21.16	1.18	0.96	0.58
Wheat only (25 cm apart rows)	—	2.45	—	1.00

Table 2. Effect of planting arrangement of potato-wheat intercropping on the yields of tuber, grain, protein, carbohydrate, edible food, dry matter and IER.

Planting arrangement	Yield of potato (t/ha)	Yield of wheat (t/ha)	Yield of potato + wheat (t/ha)	Income equiv. ratio (IER)*	Protein yield (t/ha)	Carbo-hydrate yield (t/ha)	Edible food (t/ha)	Dry matter of edible food (t/ha)
Potato (40 x 25 cm) only	30.73	0	30.73	1.0 c**	0.68 a	5.53 a	28.58 a	7.23 a
Potato (50 x 25 cm) only	28.57	0	28.57	1.0 c	0.63 ab	5.15 a	26.57 ab	6.72 ab
Potato (60 x 25 cm) only	27.58	0	27.58	1.0 c	0.61 ab	4.97 a	25.65 abc	6.49 ab
Potato (70 x 25 cm) only	22.36	0	22.36	1.0 c	0.49 c	4.03 b	20.79 d	5.26 c
Potato (40 x 25 cm) + Wheat	21.98	1.43	23.41	1.31 b	0.62 ab	4.98 a	21.87 cd	6.42 ab
Potato (50 x 25 cm) + Wheat	22.98	1.64	24.62	1.48 a	0.66 ab	5.30 a	23.00 bcd	6.84 ab
Potato (60 x 25 cm) + Wheat	22.74	1.46	24.20	1.42 a	0.64 ab	5.13 a	22.61 bcd	6.62 ab
Potato (70 x 25 cm) + Wheat	21.16	1.18	22.34	1.43 a	0.58 b	4.65 ab	20.86 d	6.01 bc
Wheat (25 cm apart lines) only	0	2.45	2.45	1.0 c	0.23 d	1.75 c	2.45 e	2.13 d

* Wheat price Tk. 5.00 per kg potato price Tk. 2.50.

** In column, the values having common letter(s) do not differ significantly.

crop alone yielded higher with closer spacing (40 x 25 cm) which had the highest plant population. The yield declined with decreasing plant population in sole crop potato from 30.7 to 22.4 ton per ha. The highest plant population (1000,000 plants/ha) produced 37 % more yield than the population of 57 140 plants per hectare (70 x 25 cm).

The yield of sole crop potato was higher but declined when it was grown with wheat with the same planting arrangement. Wheat was an exhaustive crop and when intercropped with potato, there was considerable competition for the nutrients. Wheat also shaded the potato plants at late vegetative stage to some extent. Hence, there was inter and intra species competition which resulted in the yield reduction of potato. The reductions were 28 to 4 % of the sole or monocrop potato (Table 1). Potato when planted in 40 x 25 cm spacing and intercropped with wheat, produced 72 % yield of its sole crop. The reduction in yield of potato was minimized by using wider row spacing. Potato when grown in 50 x 25 cm spacing and intercropped with wheat produced 80 % of sole crop yield. The other two spacings, 60 x 25 cm and 70 x 25 cm, produced 82 and 96 % of monoculture yield, respectively. The yield reduction at spacing of 40 x 25 cm might be due to greater inter and intra species competition for light, nutrients and water.

Wheat yield was higher within spacing of 50 x 25 cm when grown in association with potato. Closer or wider spacing of potato exerted a decreasing trend for wheat yield when grown as intercrop. This might be due to higher plant population in closer spacing (40 x 25 cm) and

lower plant population in wider spacing (60 x 25 cm or 70 x 25 cm).

The highest IER was obtained by the treatment potato (50 x 25 cm) + wheat and was significantly superior to those of other treatments (Table 2). This result is in agreement with those of Singh and Singh [2], Patra and Chatterjee [1] and Razzaque *et al.* [5]. No significant differences were observed in protein, carbohydrate yield and dry matter of edible food as obtained in sole and intercropping of potato and wheat.

From Tables 1 and 2 it is rather clear that intercropping of wheat in potato had both agronomic and economic advantages over the sole crop of potato irrespective of planting arrangements when the relative yield and IER's compared. However, from IER, it may be concluded that 50 x 25 cm and 60 x 25 cm were suitable for potato —

wheat intercropping. Further studies are necessary in order to arrive at a more definite conclusion.

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