INTERCROPPING SYSTEM OF WHEAT ALONG WITH GRASSPEA AND LENTIL UNDER DIFFERENT SOWING PATTERN

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Extended Summary

Pulses are important not only for human and animal vegetable protein rich in essential amino acids but also sustaining soil fertility. The annual requirement of pulses in Bangladesh is about 4.4 million ton considering 80 g/head/day consumption recommended by FAO. But the annual production is less than 0.54 million ton, which is consuming as only 10 g/head/day. Due to paradoxical growth of rice, maize and wheat production, the pulses have been pushed down to marginal land with low level of management thus harvesting lower yields. On the other hand, low yield potential made the pulse crop less competitive with high valued crops. It is time demanding to bring the pulses cultivation in the main field with high yielding varieties for a solution against this backdrop of pulse production. The important way is introducing intercropping system in cereal based cropping system. Pulse is proved to be a successful companion crop grows together with cereal to achieve increased productivity per unit area of land over sole cropping. An attempt was therefore desired to undertake experiments to study the intercropping system of wheat-grasspea/lentil for increased productivity. A project was initiated during November, 2008 at the research field of Sher-e-Bangla agricultural University, Sher-e-Bangla Nagar, Dhaka with the financial assistance of University Grand Commission (UGC) through Sher-e-Bangla Agricultural University Research System (SAURES). The project involves with two years rabi seasonal experiments, one in 2008-09 and another in 2009-10. The objective of the first year experiment was to stydy the wheat + grasspea / lentil intercropping system for increased yield under economic use of land. The experimental treatment was comprised of T_1 = Sole wheat normal row, T_2 = Sloe grasspea, T_3 = Sole lentil, T_4 = Wheat paired row (WPR), T_5 = WPR + One row grasspea, T_6 = WPR + Two rows grasspea, T_7 = WPR + One row lentil, T_8 = WPR + Two rows lentil, T_9 = 1 : 1 row ratio of wheat and grasspea, T_{10} = 3 : 1 row ratio of wheat and grasspea, T_{11} = 1 : 1 row ratio of wheat and lentil, T_{12} = 3 : 1 row ratio of wheat and lentil.

The experiment was trailed under Randomized Complete Block Design (RCBD) with three replications. The crops were sown on 12th November, 2008 and harvested on 9th March 2009. Result indicated that paired row of wheat planting pattern (T_4) gave maximum grain yield (3300 kg ha-1) and it was 3.09% higher than normal row sowing, T_1 (3200 kg ha-1). Paired row system did not get any additional cost for planting but offered a space between two paired rows of wheat

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for intercropping with grasspea/lentil keeping optimum plant population of wheat. Wheat yield was reduced between 2.84% and 39.39% when the crop was grown with grasspea and lentil thus reduced the relative yields also. The whet yield reduction was probably due to interplant competition between wheat with lower relative yields. The same trend was observed with lentil when intercropped with wheat. However, in this study, grasspea showed better compatibility than lentil as a component crop of intercropping with wheat. The maximum wheat equivalent yield (4307 kg ha-1) was from combination of wheat paired row + one grasspea row (T_5) and it was 34.55% higher than the sole wheat crop (3201 kg ha-1) (T_1). The greater wheat equivalent yield was determined from additional grasspea yield, although here wheat grain yield was reduced by 12.53% from sole wheat (T_1). Sole lentil crop showed second highest wheat equivalent yield (4015 kg ha-1) than the sole wheat, which was 25.43% higher. It was due to the high market price of lentil (75 Tk kg-1).

Treatment T_5 proved to be the best combination planting method of wheat and grasspea when the economic performance was assessed. This treatment showed the maximum net income (30,126 Tk ha-1) and BCR (1.71) among all the treatments and these were 84.37% and 31% higher, respectively than pure stand of wheat. The land advantage (38%) from F_5 with LER value 1.38 was higher than other treatments. LER value 1.38% reflects that the total grain yield (3252 kg ha-1) from wheat and grasspea was achieved from 1 hectare of land whereas this amount of yield would be needed 1.38 ha of land by cultivating wheat and grasspea as sole crops. Different scientists gave clarification about paired row system as additional space offering system for fitting any legume crop in between paired rows for maximum production and economic advantage while they were working with cereal crops and legume under intercropping systems. The second important spatial arrangement came out from the experiment as wheat and grasspea together cultivation in 3:1 row ration (T_{10}) as it showed second highest BCR (1.70) and LER (1.19) values with 58.01% more net income than sole wheat cropping.

So, the combination of wheat paired row with grasspea and lentil under low, optimum and excess level of nitrogen has been taken as second year experiment (Rabi 2009-2010) to study the performance of intercropping system of wheat paired row and grasspea under variable nitrogen level. The seeds of experiment were sown on 16th November 2009 for second year experiment.