9th Agricultural Science Congress

Abstracts

Technological and Institutional Innovations for Enhancing Agricultural Income

National Academy of
Agricultural Sciences

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variety 'HD 4712' performed significantly better than the 'HI 8498' and 'PBW 233' in terms of grain, straw and biological yields, however, remained on par with 'MACS 2846' and 'Raj 1555'. Among the different tested varieties the maximum number of tillers m^{-2} were recorded with 'PDW 233' which remained statistically on par with 'MACS 2846' but significantly superior to rest of the *durum* wheat varieties. The highest 1000-grain weight was recorded with 'MACS 2846' and it was significantly superior to rest of the tested varieties. Zinc application had significant effect on all the growth, yield attributes and yields of *durum* wheat irrespective of the wheat variety. The significantly higher values of all these parameters were recorded with application of 7.5 kg zinc/ha compared to control and 2.5 kg zinc/ha however, remained on par with 5.0 kg zinc/ha.

Studies on Organic and Inorganic Nutrition of Basmati Rice–Wheat Cropping System

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Organic nutrition of rice with SGM+80 kg N ha^{-1} as FYM+BGA and wheat with LGLM+80 kg N ha^{-1} as FYM+ *Azotobactor* gave highest yield of rice (4.2 t ha^{-1}) and wheat (3.7 t ha^{-1}) among the three organic nutrition treatments. However, this highest yield was 10% lower in rice and 20% in wheat than that was obtained with conventional inorganic nutrition (4.6 t ha^{-1} of rice and 5.0 t ha^{-1} of wheat). Assuming 50% higher prices for organic produce as compared to inorganic produce, the organic farming resulted in 27% higher net returns as compared to inorganic farming of rice-wheat cropping system. The organic farming was also found more sustainable based on soil fertility indices. Organic C, kjeldahl N and available P contents in soil were significantly higher in organic farming as compare to inorganic farming. The organic farming of rice-wheat cropping system is, thus recommended for higher income and sustainability of natural resources.

Effect of Different Combinations of Organic Manures and Biofertilizers on Yield and Soil Properties in Organic Farming of Rice–Wheat Cropping System

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Three sets of treatments. One set of treatment was applied to rice, second to wheat and third to both rice and wheat. Each set of treatments consisted of five treatments (i) farmyard manure @ 10 t/ha (FYM), (ii) green manuring, (iii) green manuring + biofertilizer, (iv) green manuring + FYM and (v) green manuring + FYM + biofertilizer. In addition, there was an absolute control for both rice and wheat. For green manuring *Sesbania aculeata* was used in rice and *Leucaena* green leaf manuring in wheat. For biofertilizers blue

green algae was used in rice and *Azotobacter* in wheat. Results indicated that application of 10 t/ha of FYM increased total grain yield of rice-wheat cropping system by 28% over control, whereas green manuring increased total grain yield of rice-wheat cropping system over control by 33%. The combinations of green manuring + biofertilizer and green manuring + FYM were more effective than FYM and green manuring alone and increased grain yield over control by 40 and 48%, respectively. The combination of green manuring + FYM + biofertilizer was still better and increased total grain yield over control by 58%. Different combinations of organic manures and biofertilizers were more effective when applied to rice than to wheat. However, application of organic manures and biofertilizers were most effective when applied to both rice and wheat. Application of different combinations of organic manures and biofertilizers also, significantly increased organic C, total N, available P and available K in soil.

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Productivity, Soil Health and Produce Quality of Rice (*Oryza sativa*) Based Cropping Systems under Organic Management Practices

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The treatments consisted of two cropping systems (rice–wheat and rice–wheat–mungbean) in rows and six combinations of organic manures and biofertilizers, farmyard manure equivalent to 60 kg N ha^{-1} (FYM), Vermicompost equivalent to 60 kg N ha^{-1} (VC), FYM residue of preceding crop (CR), VC + CR, FYM + CR + biofertilizers (B) and VC+ CR + B in columns. Biofertilizers consisted of blue green algae + cellulytic culture (CC) + Phosphorus solubilizing bacteria (PSB) in rice and Azotobacter + CC + PSB for wheat and *Rhizobium* + PSB for mungbean were tested. Results indicated that rice-wheat-mungbean cropping system gave 16% higher grain yield in rice and 6% higher grain yield in wheat than rice-wheat cropping system beside 0.5 t ha^{-1} protein rich mung grain. Application of FYM, vermicompost, FYM + crop residue, vermicompost + crop residue, FYM + crop residue + biofertilizers and vermicompost + crop residue + biofertilizers increased grain yield over control by 27, 25, 34, 36, 49 and 54%, respectively in rice and by 35, 36, 38, 40, 50 and 52%, respectively in wheat. The interaction between cropping system and nutrient combination was not significant. The protein content in wheat grains was the highest (12.43%) with vermicompost + crop residue + biofertilizers and lowest (10.2%) in the control plots. Farmyard manure or vermicompost gave only 10.7-11.2% protein content in wheat grain. Application of different combinations of organic manures and biofertilizars also significantly increased organic C, available NPK, dehydrogenase activity and biomass C in the soil.