

Abstracts

4th World Congress on Conservation Agriculture

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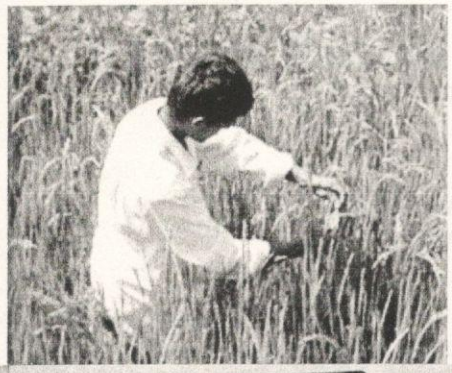

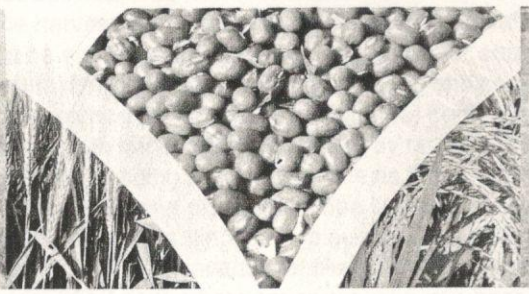


Innovations for Improving Efficiency, Equity and Environment

4th World Congress on

CONSERVATION AGRICULTURE

New Delhi, India

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Rice Wheat

over recommendation failed to provide additional gains in crop productivity and profitability, while reduction in inputs by 25% adversely affected overall productivity and profitability. Conversely, cross sowing with higher input level of 125% realized highest productivity of the crop in terms of grain (5.69 t ha^{-1}) and biological yields (12.58 t ha^{-1}). While under FIRB system, inputs levels failed to show any significant variation in crop performance as well as productivity and profitability. Among combination of studied production factors, cross sowing of variety HI 8498 with 125% SR + 125% FD produced highest yields (5.81 t ha-1 grain and 6.69 t ha^{-1} straw) and fetched net returns of Rs. 38424/- ha^{-1} and B:C ratio of 2.53.

Traditional Minimum Tillage: An Option for Sustainable Production in Rice-Wheat Cropping System

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Intensive tillage is traditionally practiced in the rice-wheat cropping system of Bangladesh that prolonged turnaround time, increased production cost and degraded soil health as well. The critical issue for wheat production in Bangladesh is the turnaround time between monsoon rice harvest and wheat sowing as yield potential reduces 1.3% per day due to lateness. Minimum tillage practices could be an important management option for sustainable production in rice-wheat cropping system. We compared minimum tillage practices with bed planting and conventional tillage to produce wheat after harvesting of short duration moon soon rice BR 32. These included (a) traditional minimum tillage: seeding by hand as broadcasting followed by one plough with hand tractor (practiced by farmers in some part of Bangladesh); (b) minimum tillage as line sowing: one plough and seeding at the same time as line sowing with a seeder attached to the hand tractor); (c) minimum tillage as stripe sowing: one plough as stripe line and seeding at the same time in the stripe with a seeder attached to the hand tractor; (d) bed planting: three ploughs followed by bed preparation with local bed planter and line sowing on the bed by hand; and (e) conventional tillage: three ploughs followed by line sowing with hand. Traditional minimum tillage was identified as the best option for resource poor farmers of Bangladesh. It runs with only one plough, kept initial moisture in soil for seed germination, no use of seeder and time or cost for line sowing which in turns reduced the production cost and reduced the turnaround time. High seedling vigor was observed with high chlorophyll content on SPAD. The yield was highest with bed planting (2.4 t ha^{-1}) followed by conventional tillage (2.2 t ha^{-1}), but the yield of traditional minimum tillage was equal to the national average (2.0 t ha^{-1}) at late sowing condition. The yield contributing characters (days to heading, grain $head^{-1}$, thousand grain weight, percentage of black seed and % germination after harvest) were also better. A good control of weed and seed-borne pathogens were observed in this crop sequence. We didn't use any fungicide, pesticide or herbicide. Therefore, major adjustments are needed to create conditions for a more conservation-oriented agriculture in rice-wheat cropping system.

Improvement of Soil Properties under Silvipastoral Systems in the Kachchh Region of Arid Gujarat

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The hot arid region covers an area of 31.70 m ha in India covering seven states that include Rajasthan, Gujarat, Punjab, Haryana, Andhra Pradesh, Karnataka and Maharashtra. Gujarat accounts for 19.6% of the total arid zone in the country of which Kachchh district alone accounts for more than 70% arid area of the state. The production and life

support systems in these hot regions are constrained by low and erratic precipitation, high evapotranspiration and poor soil physical and fertility conditions. In this fragile ecosystem, some grass species like *Cenchrus ciliaris, Cenchrus setigerus, Lasirus sindicus* etc which are very well adapted to such climate, perform well and make a natural rangelands. The climax tree species like *Prosopis cineraria, Prosopis juliflora, Acacia nilotica, Zizyphus numularia* etc. come up in these range lands and make a silvipastoral system. Animal husbandry flourishes in such locations and form an integral part of the prevailing farming system. A study was carried out to find out the effect of two land use systems *viz.* pasture (*C. ciliaris and C. setigerus)* and silipasture (*Acacia tortilis, Azadiracta indica in combnation with Cenchrus and C. setigerus)* along with degraded land/ culturable waste land. The pasture and silvipastoral systems were planted in the year 1988. At the time of planting the organic carbon content of theses soils were 0.22 % in the surface layer (0-20 cm) with pH(1:2) 8.5 and K_2O - 403 kg/ha. In the sub surface layers (20-40cm) organic C content was 0.11%, pH (1:2) - 8.4, and K_2O - 188 kg/ha. With 20 years of cultivation under silvipastoral/ pasture systems, the soil organic C under grasses improved to 0.47 to 0.58% in the surface layers and 0.23 to 0.28% in the lower layers, K_2O from 470 to 616 kg ha^{-1} in the surface and 197 to 284 kg ha^{-1} in the subsurface and pH 8.4 at the surface and 8.3 in the sub surface layers. Under silvipastoral system, the organic C content improved from 0.39 to 0.54% in the surface layers and 0.36 to 0.47% in the sub surface layers. The amount of K_2O recorded was 390-460 kg ha^{-1} in the surface and 190 to 213 kg ha^{-1} in lower surface of the soil. The soil pH under silvipastural system also showed improvement. The significant improvements in the organic C and K_2O in the soil under pasture/ silvipastoral systems suggest that the present area of 18% under cultivable waste land/ degraded land in Kachchh-Bhuj region can be improved and utilized for pasture/ silvipastoral system or even for arable farming.

Conservation Agriculture: A Sustainable and Livelihood System in Bihar, India

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Meeting food demand for increasing population and keeping pace with natural resources base is possible through Conservation Agriculture. Potential and constraints for increased adoption of resources conservation technology (RCTs) has several advantages *i.e.* reduction in cost of cultivation, improving soil quality, enhancing water table, less water requirement, enhancing fertilizer use efficiencies and production, crop diversity and mitigation of global warming. Bed planting offers greater opportunity for crop diversity including the adaptation of crops such as quality protein maize (QPM), sugarcane, pigeonpea, mungbeans, chickpea, lentil, fababeans, potatoes and vegetables.

For RCT activities, study was focused in 7 districts of Bihar (India) state namely Buagalpur, Begusarai, Darbhanga, Muzaffarpur, Samastipur, Purnia and Vaishali. Ten farmers each from RCT and non RCT villages were selected in a district. In case of zero tillage (ZT) moisture was higher than the conventional tillage (CT) practices at the time of sowing. In all the seasons *i.e. kharif, rabi* and summer, CT did not provide equal chance to grow crop plants, whereas ZT provided definite space to each and every plant. Less plant geometry in ZT accommodated high plant population and added in yield. Seed requirement was almost half in ZT in comparison to CT in the areas surveyed. Lower seed rate was also observed in wheat. Average seed requirement in CT and ZT wheat was 108.88 kg ha^{-1} and 80.87 kg ha^{-1}. Number of irrigation requirement in ZT was about half in comparison to CT. Higher average number of tillers were also observed in ZT practiced plot and lower in CT in paddy. High cost of weed control was involved in CT (Rs. 2919.57/- ha^{-1}) in comparison to ZT (Rs. 650.43/- ha^{-1}) in *kharif* 2006. In wheat (*rabi*, 2006-07) cost of weed control was also higher in CT (Rs. 334.14/- ha^{-1}) in comparison to ZT (Rs. 99.39/- ha^{-1}). ZT crop was lower in height (32.45 cm) in comparison to CT (37.46 cm) and also required less labour. Diesel requirement in CT was about 7 times more. For all the seasons and crops, highest yield was observed in ZT crop. It was because of better opportunity to grow crops, high water and fertilizer use efficiency, longer duration and less competition with weeds. CT produces about 7 times more CO_2 in comparison to ZT.