ZERO TILLAGE CULTIVATION - A VIABLE OPTION FOR LARGE SCALE PRODUCTION OF RAPESEED-MUSTARD IN RICE FALLOW

Water scarcity during post-monsoon seasons and lack of irrigation facilities, short time lag after rice harvest for seed sowing and high incidence of pests and diseases in late sown crops are the major constraints for oilseed cultivation in the NEH region. As a result, only monocropping of rice is practiced and the farmers left their land fallow. The Directorate of Extension Education, Central Agricultural University, Imphal in collaboration with Directorate of Rapeseed-Mustard Research, Bharatpur implemented an extension project entitled, "Augmenting Rapeseed-Mustard Production of Tribal Farmers of North Eastern States for sustainable livelihood security" under the Tribal Sub-Plan (TSP) during *rabi*,2011.Yield performance of rapeseed, varieties M-27andTS-36, yellow *sarson*, Ragini and mustard varieties, Pusa Agrani, Pusa Mahak, NRCHB-101 and NPJ-112 were evaluated in 55 ha under Zero tillage cultivation and compared with crops grown in 40 ha under conventional tillage. Besides, no tillage (zero tillage) practice, use of 4 (four) bee colonies/ha during crop bloom for pollination and spray of botanical pesticides without affecting pollinators population and production of organic honey, were demonstrated.

Since there was no rain throughout the crop period, the growth and yield parameters in all the rapeseed-mustard varieties were better in zero tillage than conventional tillage due to residual soil moisture after rice harvest. Among the rapeseed varieties, yellow *sarson*, Ragini gave the maximum average yield of 10.0 q/ha (range : 8.0 to 14.0 q/ha), whereas, NRCHB-101 among mustard varieties gave maximum average yield of 10.2 q/ha (range :8.0 to 11.0 q/ha) both in zero tillage cultivation.

In all, 172 farmers across 9 (nine) villages of Imphal East District involved in the project improved their income by getting average net profit of Rs. 27,388/ha including cost of honey within three and half months with a low investment of Rs. 13,412/ha. By observing the standing crop in the field altogether 1419 farmers across 50 villages in 10 (ten) districts of 3(three) North Eastern States, Manipur, Mizoram and Arunachal Pradesh adopted this technology and the area coverage under Zero tillage cultivation of rapeseed-mustard increased to 1010 ha during *rabi*, 2012 and 2013.

Under the water stress situation where there was no rainfall during the crop period of *rabi*, 2012, M-27 among rapeseed varieties and YSH-401 among yellow *sarson* varieties and NRCHB-101 among mustard varieties gave maximum average yield of 6.0, 10.0 and 11.9 q/ha, respectively under zero tillage cultivation.

Similarly during *rabi*, 2013 under the water stress situation, TS-38 among rapeseed varieties, YSH-401 among yellow *sarson* varieties and NRCHB-101 among mustard varieties gave average yield of 7.9, 9.5 and 11.8 q/ha, respectively under zero tillage cultivation.

The present success story in the farmers' field indicates that rapeseed-mustard is a climate resilient crop which can be grown without water in the residual soil moisture. By adopting zero tillage, the farmers could increase the productivity, reduced cost of cultivation thereby increasing the cropping intensity and earning an additional income for themselves with less effort. Zero tillage also helps in timely sowing (October-November), conserves soil moisture and requires less water, saves tillage cost and time and the soil is protected from erosion due to the retention of surface residues and reduce organic matter depletion.

The improved version of this Zero tillage cultivation with bee pollination and no chemical method of plant protection may be recommended to the resource poor farmers of the North Eastern Region in the context of climate change.

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Zero tillage cultivation of Rapeseed, TS-38

Zero tillage cultivation of Indian Mustard, NRCHB-101

Bee colonies for pollination