

Efficient recycling of mustard straw through vermicomposting for sustainable production of barley in semi arid eastern plain zone of Rajasthan

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Accepted : October, 2008

ABSTRACT

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A field experiment was conducted during rabi seasons 2002-03 to 2004-05 at ARS, Durgapura, Jaipur under irrigated coarse textured micro-farming situation to study the effect of vermicomposted mustard straw on sustainable production of barley (var. R.D.- 2035) in loamy sand soil of semi arid eastern plain zone of Rajasthan. Three years pooled data revealed that application of 75% recommended dose of fertilizer (NPK) + 5 tonnes vermicomposted mustard straw ha⁻¹ gave significantly higher grain and straw yield (48.09 and 74.59 q ha⁻¹) as compared to recommended dose of NPK (80:40:0) without organic manure *i.e.* 41.34 and 61.68 q ha⁻¹, respectively and found at par with 100% recommended dose of NPK + 10 tonnes FYM ha⁻¹ and 50% recommended dose of NPK + 7.5 ton vermicomposted mustard straw ha⁻¹. Increasing dose of vermicomposted mustard straw reduces the dose of inorganic fertilizer in barley crop and increases the organic carbon content in soil.

Key words : Barley, Electrical Conductivity (EC), Vermicomposted mustard straw (V.C), Organic carbon (OC).

With the adoption of chemical farming, lands in many situations have degraded and lost their fertility. Food and water are contaminated and environment polluted. This ultimately reduced crop yields in relation to increased cost of cultivation. In the integrated nutrient management for crops, role of organic manures is very important. Organic manures are not yet available in required quantity. Adoption of vermicomposting technology constitutes an essential component of organic farming. In India nearly 7000 million metric tones (MT) of organic materials such as farm wastes, kitchen wastes and dairy wastes are produced yearly (Bhaiday, 1994). Vermicompost is a rich source of macro and micronutrients, vitamins, enzyme, antibiotics, growth hormones and immobilized microflora (Bhawalker, 1991). High production of mustard in the Rajasthan state has resulted an accumulation of large quantity of mustard straw, which is neither used as cattle feed nor as manure. An attempt was made to develop a technology for conversion of mustard straw into vermicompost and its effect on the crop production of barley and fertility status of the soil.

MATERIALS AND METHODS

Preparation of vermicompost from mustard straw:

A pit of 2 x 1.5 x 1.0 m in length, width and height was prepared for utilizing about 80 kg mustard straw. The inner wall of the pit was plastered by a mixture of cow dung, heavy soil and water. Threshed mustard straw, fresh cow dung, heavy soil and urea in a ratio of 8:2:1:0.1 was filled in the pit after well mixing of all the ingredients. Water was sprinkled on this mixture materials and turning

was done at an intervals of 15 days in the pits. After 30 days of filling, one kg of earthworms (*Esenia foetida* Sp.) and one packet (1/4 Kg) of *Trichoderma viride* was added to the mixture and mixed well. The pit was covered with gunny bag and the water was sprinkled to maintain 30-35% moisture through the process. A good quality of vermicompost was obtained after 95-100 days.

A field experiment was conducted with barley crop (Var.- R.D. 2035) under irrigated coarse textured micro-farming situation at Agricultural Research Station, Durgapura, Jaipur during winter (*rabi*) seasons of 2002-05 on the same site with similar layout and treatments. The soil was loamy sand in texture having pH (1:2 soil water suspension) 8.2, EC 0.12 dSm⁻¹, organic carbon 0.18%, available N, P₂O₅ and K₂O were 120.0, 27.00 and 159.6 kg ha⁻¹, respectively. The experiment was laid out in randomized block design with 12 treatments (Table 2) replicated three times. Vermicomposted mustard straw, FYM, half dose of nitrogen and full dose of phosphorus were applied before sowing of barley crop. Remaining half dose of nitrogen was applied in two split doses as top dressing at time of tillering and booting stages. Yield data were recorded after harvest of the crop. Initial and post harvest soil samples were collected and were analysed for organic carbon, available nitrogen, phosphorus and potash by standard methods (Jackson, 1958).

The nutrient contents and pH of vermicompost mustard straw and FYM are given in Table 1.

RESULTS AND DISCUSSION

The fresh mustard straw used for preparation of