

## Effect of vermicompost and NPK on wheat yield in agri-silviculture system under Satpura plateau of Madhya Pradesh

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### ABSTRACT

A field experiment was carried out during the rabi season of 2002-2003 and 2003-2004 on a clay loam soil to evaluate the effect of vermicompost and NPK on wheat yield (*Triticum aestivum*) in agri-silviculture system. Wheat Malwa Shree (HI 83-81), Malwa Shakti (HI 84-98) and JW -17 combine with basal dose of vermicompost 3 t/ha and 50 % recommended dose of NPK recorded significant differences over to vermicompost alone treatment and control (No use of NPK). While treatment 100 % recommended dose of NPK gave at par results. Treatment vermicompost 3 t/ha gave significant differences over control. Silvi component Khamer (*Gmelina arborea*) recorded average height 315 cm and diameter at breast height 21 cm during two years. It has less shedding character hence it could minorly affected wheat yield but it is further estimated that timber of Khamer tree give approximate net return of Rs 0.55 lakh/ha from cutting after the period of six years. In view of economics treatment vermicompost 3 t/ha with 50 % recommended dose of NPK curtailed at least half cost of the chemical fertilizer as well as sustained yield. Besides, in terms of intangible returns vermicompost not only supplies essential elements to plant but also improve physiochemical and biological properties of soil, thus having promise to marginal and resource poor farmers and this may be good asset for sustainable agriculture in India in years to come.

**Key words :** Vermicompost, Nitrogen, Phosphorus, Potash, Wheat, Madhya Pradesh.

### INTRODUCTION

Agri-silviculture system has significant potential for maintaining soil fertility under continuous cropping. Trees add organic matter and minerals through their leaves, which is expected to improve physical, chemical and biological properties of soil (Singh, 1993). Integrating chemical fertilizers with organic manures has been

found to be quite promising not only in maintaining their productivity but also in providing greater stability in crop production (Nambiar and Abrol, 1992). Farm yard manure is being used as a major source of organic manure in field crops. Limited availability of this manure is, however an important constraint in its use as a source of nutrients. Vermicompost has been suggested as vital organic manure for use in integrated management practices in field crops (Shroff and Devasthali, 1992). It is well known fact wheat crop responds to apply nitrogen upto 120 to 150 kg/ha (Prakash *et al.*, 1990) and some substitution of plant nutrients particularly all nutrients except nitrogen may be achieved by using organic manures. However, effect of vermicompost and NPK on wheat yield in agrisilviculture system has not been reported. Keeping in view the studies were carried out to study the effect of integration of chemical fertilizer with vermicompost on wheat crop.

### MATERIALS AND METHODS

The field experiment was conducted during winter seasons of 2002 - 03 and 2003 - 04 at Farm of Zonal Agriculture Research Station, Chhindwara. The treatment combination 3 varieties Malwa Shree (HI 83-81), Malwa Shakti (HI 84-98) and JW - 17 and 4 levels of vermicompost and chemical fertilizer viz. vermicompost 3 t/ha, vermicompost 3 t/ha plus 50 % recommended dose of NPK (50:30:20 NPK kg/ha), recommended dose of NPK (100:60:40 kg/ha) and control were tested in a 3 times replicated randomized block design. Seedlings of Khamer tree (*Gmelina arborea*) were planted in 0.75 m<sup>3</sup> pit size during July 2002 in a spacing of 5x 5 m. Gross plot size was 10 x 15 m (5 plants/plot). The soil was sandy loam, low in available N (230 kg/ha), P<sub>2</sub>O<sub>5</sub> (8.8 kg/ha) and moderate to high in available K (585 kg/ha) with pH 7.1. The whole quantity of P, K, vermicompost and half N (as per treatment) were placed below the seed at the time of sowing. The crop was sown on 2<sup>nd</sup> November 2002 and 4<sup>th</sup> November 2003

and crop was harvested on 21<sup>st</sup> March 2003 and 24<sup>th</sup> March 2004 respectively. The data on various yield attributes, grain and biological yield were recorded in different treatments.

### RESULTS AND DISCUSSION

The 2 years results revealed that level of vermicompost alone, integration of vermicompost with 50 % recommended dose of NPK and recommended dose of NPK improved the yield over control. Number of effective tillers, grain and biological yield were maximum with treatment recommended dose of NPK but statistically at par with treatment vermicompost 3 t/ha + 50 % recommended dose of NPK. However, effect of organic manure and NPK was non significant on harvest index. The beneficial effect of vermicompost on yield attributes grain yield and biological yield due to available plant nutrient directly to the plant and also had solubilizing effects on fixed form of nutrients similar results have also reported by Shroff and Devesthali (1992).

Variety Malwa Shakti produced highest no. of effective tillers/plant, grain and biological yield closely followed by variety Malwa Shree. Both these varieties produced significantly higher grain yield than variety JW-17. The integration of vermicompost and chemical fertilizer also exerted its effect on grain and biological yields of wheat. The productivity of crop in term of grain yield was recorded maximum in treatment Malwa Shakti with recommended dose of NPK but statistically at par variety Malwa Shree with vermicompost 3 t/ha plus 50% recommended dose of NPK.

Silvi component Khamer (*Gmelina arborea*) recorded average height 315 cm and diameter at breast height 21 cm during two years. It has less shedding character hence it could minorly affected wheat yield but it is further estimated that timber of Khamer tree give approximate net return of Rs 0.55 lakh/ha from cutting after the period of six years. In view of economics treatment vermicompost 3 t/ha with 50 % recommended dose of NPK curtailed at least half cost of the chemical fertilizer as well as sustained yield. Besides, in terms of intangible returns vermicompost not only supplies essential elements to plant but also improve physiochemical and biological properties of soil, thus having promise to marginal and resource poor farmers and this may be good asset for sustainable agriculture in India in years to come.

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**Table :** Yield attributes, yield and harvest index of Wheat as influenced by various treatment (mean of 2 years)

Treatment	Effective tillers/m row length at harvest (No.)	Grain yield (q/ha)	Biological yield (q/ha)	Harvest index (%)
<i>Vermicompost and NPK level</i>				
Vermicompost 3 t/ha	73.28	25.27	58.37	43.29
Vermicompost 3 t/ha + 50% recommended dose of NPK	85.00	30.69	70.58	43.48
Recommended dose of NPK	89.55	31.57	72.29	43.67
Control	54.73	16.13	37.09	43.48
CD (P=0.05)	5.21	3.60	6.80	NS
<i>Variety</i>				
Malwa Shree (HI 83-81)	72.35	26.33	60.59	43.45
Malwa Shakti (HI 84-98)	78.29	27.73	63.22	43.86
JW-17	66.15	23.69	54.72	43.29
CD (P=0.05)	5.96	3.10	4.80	NS

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