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Alankar Singh
College of Forestry, Ranichauri, UUHF, Bharsar, Uttarakhand, India

Pallavi
Department of Agriculture, DIBNS, Dehradun, Uttarakhand, India

SN Dubey
A.S. College, Lakhaoti, Bulandshahr, Uttarakhand, India

Sumit Chaudhary
College of Forestry, Ranichauri, UUHF, Bharsar, Uttarakhand, India

Corresponding Author:
Alankar Singh
College of Forestry, Ranichauri, UUHF, Bharsar, Uttarakhand, India

Residual effect of nutrient management in oat on succeeding maize crop

Alankar Singh, Pallavi, SN Dubey and Sumit Chaudhary

Abstract
Oat and Maize (*Zea mays* L) are important food and fodder crops widely used in India. To assess the residual effect of application of organic manure and bio-fertilizer in oat crop on growth and yield of maize, experiment was conducted during 2009-10 and 2010-11 at AS College Lakhoati, Buledsahar, Uttar Pradesh. The treatments consisting of three oat varieties and nine integrated nutrient management (INM) combinations for oat crop was laid out in factorial Randomised Block Design during *rabi* season and its residual effect on maize crop was observed during *kharif* season for both the years. Plant height, 1000- grain weight and seed yield of maize was significantly influenced by the different Oat varieties and nutrient management in preceding oat crop.

Keywords: Maize, INM, Yield, Oat

Introduction
Oat and maize are one of the important food as well as fodder cereal crop of India. Oats (*Avena sativa* L.) locally known as *javi*, *jai*, or *jodar*, belong to the poaceae family is mainly grown for fodder purpose in winter season. The oats grain is particularly valuable feed for horses, dairy cows, poultry and young breeding animals of all kinds (Hussain *et al.*, 2002) [5]. Management practices such as time of harvest, fertilization, planting date and crop rotation were found to influence yield and forage quality of oat and succeeding crop. Among different agronomic practices, selection of variety, nutrient management and suitable crop rotation plays an important role in improving growth and productivity of a crop(s). Despite the growing prominence of oats in today's production systems, limited research on fertilizer management for oats has been conducted in this region. In spite of substantial fertilizer use, the crop yields are not increasing correspondingly, which reflect low fertilizer use efficiency (FUE). Organic fertilizers including bio-fertilizers may be used along with (INM) or as a substitute of the chemical fertilizers for the crop production to minimise the degradation of soil caused by the application of inorganic fertilizers in an unbalanced amount. The integration of organic sources and synthetic sources of nutrients (INM) not only supply essential nutrients but also have some positive interaction to increase nutrient use efficiency and thereby reduce environmental hazards and improves soil properties (Ahmad *et al*, 1999; Khaliq *et al.*, 2004 and Deksissa *et al.*, 2008) [1, 7, 2]. In addition, application of organic manure or others organic material may also generate a positive residual effect on succeeding crop (Eghball *et al*., 2004; Hirzel *et al*., 2007) [3, 4]. Also residual effect of fertilizer can greatly affect the yield. The residual N effect obtained with organic residues is mainly because some N is adsorbed or incorporated into the clay and organic soil fraction and is immobilized by soil microbial biomass (Jensen *et al*., 2000; Sorensen and Amato (2002) and Sainz *et al*., 2004) [6, 10, 9]. To assess residual effect on maize crop by application of INM technologies in three different varieties of oat crop, an experiment was conducted during 2009-10 and 2010-11 at AS College Lakhoati, Buledsahar, Uttar Pradesh.

Materials and Methods
The field experiment was conducted at Agricultural Research Farm of Amar Singh (PG) College, Lakhaoti, Bulandshar (U.P.) during 2009-10 and 2010-11. The experimental site is situated at 28.4° North and 77.1° East with an altitude of 207 metre above mean sea level. The soil of experimental site is classified as Indo-Gangatic alluvium with sandy loam in texture with neutral in reaction (soil pH), medium in organic carbon and available nitrogen, phosphorus & potassium content.

The experiment was laid out in factorial randomized block design with three replications at the same site during both the years. The treatments consisting of three oat varieties *viz.* Kent (V_1), JHO – 822 (V_2) and JHO – 851 (V_3) and nine integrated nutrient management combinations for oat crop *viz.* 50 % of Recommended dose of Fertilizer (RDF) (F_1), 75 % of RDF (F_2), 100 % of RDF (F_3), 50 % of RDF + Vermi Compost (F_4), 50 % of RDF + Azotobactor (F_5), 50 % of RDF + Vermi Compost + Azotobactor (F_6), 75 % of RDF + Vermi Compost (F_7), 75 % of RDF + Azotobactor (F_8), 75 % of RDF + VermiCompost + Azotobactor (F_9) was laid out in factorial Randomised Block Design with three replications during *rabi* season and its residual effect on maize crop was observed during *kharif* season for both the years. The oat crop was sown at row to row distance of 25 cm and plant to plant distance of 5 cm with a seed rate of 80 kg/ha. The RDF for Oat crop was 120 kg N, 40 kg P_2O_5/ha and 40 kg K_2O/ha. Half dose of nitrogen and full dose of P_2O_5 and K_2O was applied as basal dose. After harvesting of the *rabi* crop (Oat), the experimental field was prepared for the sowing of maize crop in the month of July 2010 and 2011. The field was irrigated to provide moisture for optimum germination and sowing was done at row to row distance of 45 cm and plant to plant distance of 10 cm was maintained. Normal crop husbandry was followed for both the crops during both the year of experimentation. The experimental data obtained during the various studies in maize crop were analysed statistically following the standard procedure for factorial randomized block design. The significant difference at 5 per cent level of probability was calculated.

Result and Discussion

The data pertaining to plant height (cm), 1000-grain weight (g) and grain yield (kgha^{-1}) of maize is given in Table 1. The residual effect of INM on oat significantly influenced the growth and yield of maize crop. The plant height of maize was significantly influenced by application of integrated nutrient management in the preceding oat crop during both the years. Tallest plants of maize (179.25 & 183.59 cm) were noted in plots previously treated with 75 % of RDF + Vermi Compost + *Azotobactor* during both the years respectively. Shortest plants of maize (139.71 & 142.25 cm) were noted in plots receiving only NPK through chemical fertilizer during both the years respectively. More plant height was recorded in 2010 than 2009. Significant differences were recorded in case of 1000-grain weight of maize in different fertility treatments applied to previous crop (Oat). Application of 75 % of RDF + Vermi Compost + *Azotobactor* to that previous oat crop gave maximum 1000-grain weight of maize (253.15 & 255.22 g) followed by 50 % of RDF + Vermi Compost + *Azotobactor*. Minimum 1000-grain weight was noted in 50 % of RDF treatments. More plant height and heavier grains were attained in 2010 than 2009 which might be due to favorable weather conditions during 2010. Different nutirent fertility treatments showed significant differences for grain yield of subsequent maize crop. Maximum grain yield of maize was recorded in plots treated with 75 % of RDF + Vermi Compost + *Azotobactor* followed by 50 % of RDF + Vermi Compost + *Azotobactor*. Lowest grain yield was observed in 50 % of RDF plots of oat crop. The highest grain yield obtained with vermicompost might be due to balance supply of nutrients from vermicompost which improved yield components thus yield. More plant height, 1000-grain weight were noted in plots previously treated with 75 % of RDF + Vermi Compost + *Azotobactor*. This may be due to soil fertility (N, P and organic carbon) was improved significantly with Vermi Compost used either alone or in combination with fertilizer over that of initial soil status. Saleem (2010) [8] also reported that wheat yield increased by 20% with the application of sole poultry manure @ 15 t ha^{-1} and 15% increase in response to complementary application of fertilizers in preceding seasons.

Table 1: Plant height, 1000-grain weight and seed yield of Maize as influenced by INM practices in oat

Treatments	Plant Height (cm)		1000-grain weight (g)		Grain yield (kgha^{-1})	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Oat Varieties						
Kent (V_1)	165.25	163.95	236.78	238.12	2956.85	3316.45
JHO 822 (V_2)	156.96	158.56	239.64	241.45	3259.59	3564.14
JHO 851 (V_3)	162.25	161.23	234.12	236.22	3284.98	3373.98
SEm±	3.75	3.45	3.68	4.25	125.69	113.56
CD (5%)	9.56	8.78	NS	NS	NS	NS
Fertilizer Management						
50 % of RDF (F_1)	139.71	142.25	232.67	234.32	2983.59	3376.85
75 % of RDF (F_2)	152.56	147.99	240.87	242.54	3284.75	3420.35
100 % of RDF (F_3)	159.85	145.26	245.56	246.78	3476.85	3459.85
50 % of RDF + Vermi Compost(F_4)	154.89	158.89	249.48	251.46	4167.75	4578.23
50 % of RDF + *Azotobactor* (F_5)	148.89	149.58	243.12	243.89	4058.46	4167.85
50 % of RDF + Vermi Compost + Azotobactor (F_6)	167.25	163.59	249.89	253.45	4589.56	4798.56
75 % of RDF + Vermi Compost (F_7)	171.25	173.56	247.48	249.25	4570.24	4695.85
75 % of RDF + *Azotobactor* (F_8)	165.89	169.56	246.89	248.46	4552.59	4896.36
75 % of RDF + Vermi Compost + *Azotobactor* (F_9)	179.25	183.59	253.15	255.22	4732.56	5412.56
SEm±	3.93	3.59	2.85	3.54	112.58	109.85
CD (5%)	**9.74**	**9.12**	**6.11**	**8.97**	**325.25**	**296.89**

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References

1. Ahmad B. Effect of different levels nitrogen seeding density on growth yield and quality of maize fodder. MSc Thesis Dept Agron Uni Agri, Faisalabad, 1999.
2. Dekisissa T, Short I, Allen J. Effect of Soil Amendment with compost on growth and Water Use Efficiency of

Amarnnath. In: Proc. of the UCOWR/NIWR Annual Conf.: Int Water Res.: Challenges for the 21st Century and Water Resources Education, July 22-24, 2008, Durham, NC, 2008.
3. Eghball B, Ginting D, Gilley JE. Residual effects of manure and compost applications on corn production and soil properties. Agron. J. 2004; 96:442-447
4. Hirzel J, Walter I, Undurraga P, Cartagena M. Residual effects of poultry litter on silage maize (*Zea mays* L.) growth and soil properties derived from volcanic ash. Soil Sci. Plant Nutr. 2007; 53:480-488.
5. Hussain A, Khan S, Mufti MU, Bakhsh A. Introduction and use of oats cultivars in Pakistan. Proceedings of "5 TAPAFON (Temperate Asia Pasture and Fodder Network) meeting/conference held at Renewable Natural Resources Research Center, Bajo (WangdueBhutan), 2002, 159-166.
6. Jensen LS, Pedersen IS, Hansen TB, Nielsen NE. Turnover and fate of 15N-labelled cattle slurry ammonium-N applied in the autumn to winter wheat. Eur. J Agron. 2000; 12:23-35.
7. Khaliq T, Mehmmod T, Kamal J, Masood A. Effectiveness of farmyard manure, poultry manure and Nitrogen for Corn (*Zea mays*) productivity. Int. J Agri. Boil. 2004; 6(2):260-263.
8. Saleem. Economic feasibility of integrated nutrient management for sustainable rainfed maize-legume based intercropping systems. PhD thesis.Department of Agronomy, Faculty of Crop and Food Sciences, PirMehr Ali Shah Arid Agriculture University Rawalpindi, Pakistan, 2010.
9. Sainz HR, Echeverría HE, Barbieri PA. Nitrogen balance as affected by application time and nitrogen fertilizer rate in irrigated no-tillage maize. Agron. J. 2004; 96:1622-1631.
10. Sorensen P, Amato M. Remineralisation and residual effects of N after application of pig slurry to soil. European Journal of Agronomy. 2002; 16:81-95.