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Short Communication

Outcome of Mulching and Phosphatic fertilizer on Germination and Yield of Turmeric

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ABSTARCT

The present study was conducted at Krishi Vigyan Kendra, Kapurthala during the year 2016-17 in order to evaluate the effect of mulching and phosphatic fertilizer on germination and yield of Turmeric. Five different treatments consisted: T1 - Control (No inorganic fertilizer or mulch), T2 - 100 per cent recommended dose of fertilizer (DAP 55kg/ha and MOP 40 kg/ha) + No mulch, T3 - 25 per cent more DAP (68 kg/ha) + recommended dose of MOP (40 kg/ha) + No mulch, T4 - T2 + mulch @ 6t/ha and T5 - T3 + mulch @ 6t/ha. The experiment was laid out in randomized complete block design (RBD) consists of 3 replications. The study revealed that maximum germination was recorded in treatment T5 followed by T4. There was no significant difference between T5, T4 and T3 regarding rhizome count per plot, on the other hand, T2 was at par with T1. Maximum turmeric yield was obtained under T5 followed by T4, T3, T2 and T1. Hence, it can be said that in order to maximize the rhizome yield of turmeric, farmers must apply 25 per cent more quantity of phosphatic fertilizer than the recommendation along with use of mulching material @ 6 t/ha.

Key Words: Germination, Mulching, Phosphatic fertilizer, Rhizome yield, Turmeric.

INTRODUCTION

Turmeric is herbaceous perennial plant that belongs to family Zingiberaceae. Turmeric is grown for its underground rhizome, which is mainly used as spice or condiment. In addition to this, it has a wide range of medicinal properties. Turmeric is mainly cultivated in India, China, Bangladesh, Sri Lanka and Pakistan. India accounts for 80 per cent of world's output of turmeric. India is also the largest exporter of turmeric in the world. (Anonymous, 2012). Turmeric has many medicinal properties and considered as analgesic, antibacterial, antitumor, anti-allergic, antioxidant, antiseptic, appetizer, astringent, cardiovascular, cholagogue, diuretic and stimulant. It neutralizes the cancer causing substances and conditions. It directly helps the cell to retain its integrity, if threatened by carcinogens. It is useful in treating dropsy, wounds and inflammation (Khanna, 1999). Owing to its long duration and high productivity, turmeric requires heavy input of fertilizer (Peter *et al,* 2000) and more irrigation. Considering the heavy fertilizer requirements, inorganic fertilizers are applied only during first 3 months as compared to 7-8 months life cycle of the plant (Issac and Varghese, 2016). In Kapurthala district, 50 per cent area is having sandy soils with very less water holding capacity and therefore, frequent irrigation is required to grow any crop. Hence, mulching can play an important role in reducing irrigation frequency and enhancing seed germination. Sanyal and Dhar (2008) have reported a significant effect of mulching on yield of turmeric.

During 2015-16, turmeric rhizomes were

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given in demonstrations to 10 farmers in district Kapurthala and yield was calculated as 200-250 t/ha. The major reason for the variation in yield was observed with application of higher use of phosphatic fertilizers applied by the farmers in the form of diammonium phosphate (DAP) instead of single super phosphate and mulch. The study was conducted to evaluate the effect of mulching and phosphatic fertilizer on germination and yield of turmeric during 2016-17.

MATERIALS AND METHODS

The present study was conducted at Krishi Vigyan Kendra Kapurthala during the year 2016-17. Trial comprised of 5 treatments: T1: control (no inorganic fertilizer or mulch), T2: 100 per cent recommended dose of fertilizer (DAP 55 kg/ha and MOP 40 kg/ha) + no mulch, T3: 25 per cent more DAP (68 kg/ha) + recommended dose of MOP (40 kg/ha) + no mulch, T4: T2 + mulch @ 6t/ha, T5: T3 + mulch @ 6t/ha. It was worth to note that single super phosphate fertilizer is not available in the market so it was planned to evaluate effect of DAP along with mulch. The experiment was laid out in randomized complete block design (RBD) replicated three times. The experiment area was low in nitrogen, phosphorus and potash. Rhizomes were planted on 27th April, 2016 at 45cm x 15cm spacing with plot size of 4m X 5.4 m^2. Immediately after planting, wheat straw was applied as mulch material. Irrigations were applied as per the requirement of the crop. Emergence count was taken at 40 days after sowing (DAS), yield parameters and yield data were recorded at harvest from all the plots on 8th February, 2017. Data were statistically analyzed using OPSTAT software (Sheoran *et al,* 1998).

RESULTS AND DISCUSSION

Emergence count (Germination)

The data presented in table 1 revealed significant difference in emergence count between mulch and non-mulch plots. The maximum emergence was recorded in T5 (84.67%), which was statistically at par with T4 (81.33%) and were significantly superior to all the other treatments (<68% emergence). This showed the benefit of mulching that emergence increased with mulching irrespective of the dose of inorganic fertilizer. So, the thumb rule for better emergence of turmeric is mulching after the sowing of crop, which will conserve moisture reduce soil temperature during initial two hot months i.e., May and June. This quick and favorable effect of mulching also reduces competition with weeds and improves growth parameters of turmeric.

Rhizome count and dry weight (q/ha)

A similar trend was observed in rhizome count and rhizome dry weight from table 1. In rhizome count per plot, maximum number was observed in T5 (197.0), which were statistically better than all the other treatments. This showed that increased DAP application along with mulching resulted more number of rhizomes and in turn higher dry rhizome weight (149.5 q/ha). These results were in agreement with Banwasi and Singh (2010). Likewise Kumar *et al* (2008) also reported higher dry rhizome weight of turmeric with mulching, which might be due to higher vegetative growth and more accumulation of photosynthates in mulched plots.

The rhizome count per plot of T4 (170.3) was at par with T3 (150.0), showing the higher demand for turmeric for inorganic fertilizers that depicts in the dry rhizome weight also. While on the second hand, T2 was at par with T1, showing alone inorganic application at RDF without mulch was unable to fulfill requirements of turmeric.

Rhizome yield (q/ha)

Maximum turmeric yield was obtained with T5 (251.0 q/ha) followed by T4 (227.7 q/ha), T3 (218.5 q/ha), T2 (176.7 q/ha) and T1 (153.7 q/ha), respectively (Table 1). This was probably due to the fact that straw mulch conserved more soil moisture and suppressed weeds, which helped to produce more number of leaves per plant, enhanced plant growth, deposited more food material and finally gave more yield. Sidhu *et al* (2016) also reported higher rhizome yield with mulching, which was might be due to higher soil moisture that creates

Table 1. Germination, rhizome count, dry and fresh rhizome yield of turmeric.

Treatment	Germination (%) at 40 DAP	Rhizome count per plot	Dry rhizome weight (q/ha)	Fresh rhizome yield (q/ha)
T1	57.3	112.7	71.5	153.7
T2	63.7	127.7	84.0	176.7
T3	67.3	150.0	124.5	218.5
T4	81.3	170.3	124.0	227.7
T5	84.7	197.0	149.5	251.0
CD at 5%	4.5	24.7	18.5	21.7

favorable environment to absorb nutrients resulting in more rhizome fresh weight.

CONCLUSION

Turmeric can be grown in diverse tropical conditions from sea level up to 1500 meters, at a temperature range of 20-35°C with an annual rainfall of 1500 mm under irrigated conditions. Though it can be grown on different types of soils, it thrives best in well drained sandy or clay loam soils with a pH of 4.5 to 7.5 with good organic status. The study indicated that in order to maximize the rhizome yield of turmeric, farmers must apply 25 per cent more quantity of phosphatic fertilizer than the recommendation along with use of mulching material @ 6 t/ha in sandy soils having low level of NPK.

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