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Standardization of date of planting and INM package to optimize yield in Rabi potato

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Abstract

The field experiment was carried out at Experimental Field of the Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar for two consecutive years (2018-2019) to identify the suitable time of planting and nutrient management for optimal yield of rabi potato under temperate valley of Kashmir. The experiment consisted of the treatments which were a combination of four planting dates viz; D₁ (1st fortnight of July), D₂ (2nd fortnight of July), D₃ (1st fortnight of August), D₄ (2nd fortnight of August) and seven combinations of organic and inorganic nutrients viz; T₁ (RFD i.e 160:100:100), T₂ (75% RFD + 25% Vermicompost), T₃ (75% RFD + 25% FYM), T₄ (50% RFD + 50% Vermicompost), T₅ (50% RFD + 50% FYM), T₆ (50% RFD + 25% Vermicompost + 25% FYM) and T₇ (Control). The observations were recorded and among different dates of planting and nutrient management, planting on D₂ (2nd fortnight of July) with nutrient combination of T₆ (50% RFD + 25% Vermicompost + 25% FYM) showed best tuber yield.

Keywords: *Solanum tuberosum*, planting dates, INM, yield

Introduction

Potato is the staple food of almost half of the world's population (Thiele *et al.* 2010)^[9]. India is the second largest producer of potato in the world (Saxena and Mathur, 2013). Planting date is considered very important to take the full advantage of the short growing period. Since tuberization rate in potato declines above a temperature of 17°C, increasing temperature may lead to reduced yields in potato. Early planted potatoes are high in starch content (White and Sanderson, 1983)^[10] and low in glucose and fructose (Nelson and Shaw, 1976)^[6] whereas, delayed planting results in reduced dry matter and starch content and increased reducing sugar (Lisinska and Leszczynski, 1987)^[5] and nitrogen content (Wierzejska *et al.* 1973)^[12] of the tubers. Therefore, standardization of the optimum date of planting is not only important for yield but also to ensure better tuber quality. While as, the integrated nutrient management paradigm acknowledges the need for both organic and inorganic mineral inputs to sustain soil health and crop production due to positive interaction and complementarities between them. It is a strategy that incorporates both organic and inorganic plant nutrients to attain higher crop productivity, prevent soil degradation and thereby help meet future food supply needs. Integrated soil fertility management is application of soil fertility management practices, and the knowledge to adapt these to local conditions, which maximize fertilizer and organic resource use efficiency and crop productivity. Thus, this study was conducted to investigate the effects of planting time and integrated nutrient management on yield of potato.

Materials and Methods

The field experiment was carried out at Experimental Field of the Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar. The experimental field (site) is situated at 34.1° North latitude and 74.89° East longitude with an altitude of 1587 meters above mean sea level. The experiment was carried out during the years 2018-2019 and consisted of the treatments which were a combination of four planting dates viz;

- D₁ (1st fortnight of July),
- D₂ (2nd fortnight of July),

- D₃ (1st fortnight of august),
 - D₄ (2nd fortnight of august)
- and seven INM treatments viz;

- T₁ (RFD i.e 160:100:100),
- T₂ (75% RFD + 25% Vermicompost),
- T₃ (75% RFD + 25% FYM),
- T₄ (50% RFD + 50% Vermicompost),
- T₅ (50% RFD + 50% FYM),
- T₆ (50% RFD + 25% Vermicompost + 25% FYM) and
- T₇ (Control).

Well sprouted tubers were planted in plot size of 3m² at the spacing of 30×10cm, design Factorial RBD with 3 replications. Data on yield was recorded and statistically analyzed.

Results

According to the observations recorded and results shown in table 1, it is concluded that treatment combination of T₆D₂ recorded i.e planting on D₂ (2nd fortnight of July) with nutrient combination of T₆ (50% RFD +25% Vermicompost +25% FYM) showed best tuber yield(28.95 t/ha).

Table 1: Effect of planting time and INM on yield of potato.

Treatment combinations	Tuber yield t/ha
T ₁ D ₁	19.00
T ₂ D ₁	19.95
T ₃ D ₁	19.50
T ₄ D ₁	21.50
T ₅ D ₁	21.80
T ₆ D ₁	23.54
T ₇ D ₁	13.25
T ₁ D ₂	20.45
T ₂ D ₂	21.45
T ₃ D ₂	21.00
T ₄ D ₂	23.64
T ₅ D ₂	23.00
T ₆ D ₂	28.95
T ₇ D ₂	15.50
T ₁ D ₃	15.45
T ₂ D ₃	16.25
T ₃ D ₃	16.00
T ₄ D ₃	18.34
T ₅ D ₃	18.25
T ₆ D ₃	20.25
T ₇ D ₃	14.34
T ₁ D ₄	12.32
T ₂ D ₄	13.45
T ₃ D ₄	13.00
T ₄ D ₄	14.14
T ₅ D ₄	14.25
T ₆ D ₄	15.00
T ₇ D ₄	10.26
C.D at 5%	1.20

The high tuber yield associated with the combined use of organic and inorganic fertilizer might be attributed to improved soil physical, chemical and biological properties due to the presence of organic manure, which consequently retained moisture for longer period for a water-loving crop like potato. Besides improving water holding capacity of the soil, organic sources are known for supplying macro and micronutrients slowly to the crop. Further, the nutrient supply might have been regulated by the presence of manure in such a way that the supply during the initial stages of growth was

in adequate amounts and readily available ionic forms thus increasing the photosynthetic activity. At later stages of growth, through mineralization, the FYM and vermicompost continuously supplied balanced nutrition to the crop consequently initiating more stolons per plant, increasing the rate of tuber formation, efficient direction of assimilates to the tubers, increasing the number of tubers per plant and tuber weight which ultimately resulted in high potato tuber yield. Similar findings were reported by Keisham *et al.* (2015) [4] Ahmed *et al.* (2017) [1], Yadav *et al.* (2017) [11] Ferdoushi *et al.* (2010) [3], Narayan *et al.* (2014) [7] and Baishya *et al.* (2010) [2].

Conclusion

Data presented in table 1 depicts that treatment T₆D₂ i.e Planting on 2nd fortnight of July and nutrient combination of (50% RFD +25% Vermicompost +25% FYM) recorded maximum potato tuber yield to the tune of 28.95 t/ha.

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