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Impact of biofertilizers, FYM and inorganic fertilizers on growth yield and quality attributes of potato *c.v* Kufri Chipsona-1

Richa Pyasi and Ranvijay Singh

Abstract

The present experiment was conducted at the, Department of Horticulture, College of Agriculture, RVSKVV, Gwalior (M.P) during the *Rabi* season of two consecutive years 2017-18 and 2018-19. The experiment was comprised of 18 treatment combinations consisting of and three levels of biofertilizers (Azotobacter 5 kg/ha), (PSB 5kg/ha) and (Azotobacter 2.5kg/ha + PSB 2.5kg/ha) and three levels of inorganic fertilizers *viz.*, (100% NPK), (75%NPK) (50% NPK), two levels of farm yard manure (FYM 20 t/ha) and (FYM10 t/ha), applied on potato processing cultivar Kufri Chipsona-1, growth, yield and quality parameters. The experiment was laid out in Randomized Block Design (RBD) with three replications. The tubers were sown in plots of size 3 x 3 m at a spacing of 60 x 20 cm. Observations for yield parameters were processing grade tuber yield (T/ha) and total yield (T/ha) of potato tubers. The treatment combination I₃O₂B₃ (100%NPK+FYM 20 t/ha + PSB2.5kg/ha+ Azotobacter 2.5kg/ha) resulted in maximum total yield (22.6 t/ha). Whereas minimum total yield (15.6 t/ha) was obtained in treatment I₁O₁B₂, during the pooled mean data, of the experiment.

Keywords: Kufri Chipsona-1, NPK, FYM, Azotobacter, PSB

Introduction

Potato (*Solanum tuberosum* L.) is a herbaceous annual dicotyledonous plant The probable ancestor of all the cultivated species of potatoes is *Solanum stenotomum* Juz. It belongs to genetically diverse genus *Solanum* which contains about 2,000 species The average composition of a potato tuber consists of dry matter (20%), starch (13-17%), total sugars (0-2%), protein (2.2%), fibre (0.7%), lipids (0.13%), fat (0.3%), vitamin C (32 mg/ 100 g fresh weight), minerals (trace), ash (1-1.5%), amylose (23-25%) and glycoalkaloids (< 1 mg/ 100 g fresh weight) as a nutritional factor. In India potato is grown in an area of around 2.17 Million hectare with total production of about 46.54 million tonnes and the productivity is 21.5 tonnes/ha (Horticultural Statistics at a Glance, 2017) [3].

Materials and Methods

The experiment was conducted at the, Horticulture research area, Department of Horticulture, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior (M.P.) during the *Rabi* season of two consecutive years 2017-18 and 2018-19. The Experimental site College of Agriculture, Gwalior is situated at 26° 13' N latitude and 78° 14' E longitudes at an altitude of 211.5 m from mean sea level in central part of Madhya Pradesh and it has a semi-arid subtropical climate. The experiment was comprised of 18 treatment combinations consisting of and three levels of biofertilizers (Azotobacter 5kg/ha), (PSB 5kg/ha) and (Azotobacter 2.5kg/ha + PSB 2.5kg/ha) and three levels of inorganic fertilizers *viz.*, (100% NPK), (75%NPK) (50% NPK), two levels of farm yard manure (FYM 20 t/ha) and (FYM10 t/ha), applied on potato processing cultivar Kufri Chipsona-1, growth, yield and quality parameters. Nitrogen was given by urea, Phosphorus and potassium were applied through single super phosphate and muriate of potash, respectively. Pre-planting seed treatment was done with Mancozeb 0.2% solution. The tubers were sown in plots of size 3 x 3 m at a spacing of 60 x 20 cm. The observations for plant growth parameters like plant height, plant emergence%, days to tuber initiation and days to harvest were recorded. Similarly, observations for yield parameters *viz.*, processing grade tuber yield (T/ha) and total yield (T/ha) of potato tubers were taken at the time of harvest. The data recorded under the study were subjected to statistical analysis as per standard procedure as suggested by Panse and Sukhatme (1985) [8].

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Results and Discussion

Growth parameters

Significant results were obtained at different growth stages (Table-1). Where maximum height of the plant, plant emergence% and less days to harvest were obtained under the treatment combination I₃O₂B₂ (100%NPK+ FYM20t/ha + PSB 5kg/ha), whereas minimum plant growth at different stages was seen in treatment I₁O₁B₁(50%NPK+FYM10t/ha +Azotobacter 5kg/ha). This may be due to fact that at higher dose of NPK, FYM and biofertilizers, the plant height and emergence percent in plants. These results are in close proximity with the results seen by Ram *et al* (2017) [11] obtained maximum plant emergence% (96.7%) with the application of NPK dose at (150:100:120 kg/ha) in potato. Jaipaul (2011) [4] also noticed maximum plant height (70.74 cm) at 100% NPK + (FYM) 10 t/ha + biofertilizers. Sharma *et al.* (2011) [7] also found that organic fertilizers + biofertilizers resulted in maximum plant height (70.7 cm). Barman *et al.* (2014) [1] observed that with the application of 150:100:120 kg NPK, 20t FYM /ha significantly affected the number of days to harvest, in potato.

Yield parameters

Treatment combination I₃O₂B₃ (100%NPK+FYM20t/ha+PSB

2.5kg/ha+ Azotobacter 2.5kg/ha) resulted in maximum yield of processing grade tubers (9.1 t/ha) and maximum total yield of tubers (22.6 t/ha). Results are in confirmation with findings of Khurana and Bhutani (2005) [10] who found that the application of treatments 75% and 100% of NPK (150:80:100kg/ha), FYM at 20t/ha and biofertilizers significantly increased the total yield of tubers. Singh *et al.* (2010) [12] also noticed similar results. Whereas, Jaipaul *et al* (2011) [4] obtained a highest total yield of (22.8 t/ha) from treatment 100% NPK + FYM at 10 t/ha + biofertilizers. Ram *et al* (2017) [11] and Yadav *et al.* (2017) [13] also revealed same findings.

Quality parameters

Among the quality parameters significant results were obtained for all the traits under observation. Highest starch% was obtained in treatment I₃O₂B₂ (26.7%), These findings are similar to results obtained by Jatav *et al.* (2017) [5] who found that variety Kufri Chipsona-2 exhibited high starch content (29.50%) and 34.87(mg/100g) reducing sugar content. Marwaha (2009) [9] also obtained a higher tuber dry matter (24.1%) from kufri chipsona-1. Kumar *et al* (2015) [6] obtained a average tuber dry matter content (22.6%) from potato chipping variety Kufri Chipsona-4.

Table1: Impact of biofertilizers, NPK and FYM on growth and yield attributes of potato.

Treatment Symbol	Treatments	Plant emergence%	Plant height (cm)	Days to tuber initiation	Days to harvest	Processing grade tuber yield T/ha	Total yield T/ha
			90 DAS				
I ₁ O ₁ B ₁	50% NPK + FYM 10 t/ha + Azotobacter 5kg/ha	84.10	55.35	35.18	119.00	4.55	16.07
I ₁ O ₁ B ₂	50% NPK + FYM 10 t/ha + PSB 5kg/ha	84.94	57.08	33.80	118.00	4.50	15.62
I ₁ O ₁ B ₃	50%NPK+FYM 10t/ha+Azotobacter 2.5kg/ha +PSB 2.5kg/ha	87.23	58.80	34.33	118.50	4.71	15.96
I ₁ O ₂ B ₁	50%NPK +FYM 20 t/ha + Azotobacter 5 kg/ha	86.32	56.02	31.70	118.33	4.65	16.80
I ₁ O ₂ B ₂	50%NPK + FYM 20 t/ha + PSB 5 kg/ha	86.18	58.87	32.37	118.17	4.72	15.70
I ₁ O ₂ B ₃	50%NPK+FYM20t/ha+Azotobacter2.5kg/ha+PSB 2.5kg/ha	83.71	57.50	35.33	118.67	5.08	16.87
I ₂ O ₁ B ₁	75%NPK + FYM 10t/ha + Azotobacter 5kg/ha	87.14	58.82	33.85	119.17	5.01	16.84
I ₂ O ₁ B ₂	75%NPK + FYM 10 t/ha + PSB 5kg/ha	84.47	58.33	33.28	118.83	5.75	18.53
I ₂ O ₁ B ₃	75%NPK + FYM 10 t/ha+Azotobacter2.5kg/ha +PSB2.5kg/ha	86.34	58.73	31.75	119.17	6.12	18.16
I ₂ O ₂ B ₁	75%NPK+ FYM 20 t/ha + Azotobacter 5kg/ha	82.76	59.05	31.75	117.67	6.65	18.48
I ₂ O ₂ B ₂	75%NPK + FYM 20 t/ha + PSB 5kg/ha	87.72	59.01	32.35	118.00	6.51	18.16
I ₂ O ₂ B ₃	75%NPK + FYM 20 t/ha + Azotobacter 2.5kg/ha+ PSB 2.5kg/ha	86.57	58.76	32.50	118.50	6.70	19.05
I ₃ O ₁ B ₁	100% NPK + FYM 10t/ha +Azotobacter 5kg/ha	87.80	58.68	31.92	118.50	7.46	19.95
I ₃ O ₁ B ₂	100%NPK + FYM 10t/ha +PSB 5kg/ha	86.92	58.62	31.88	118.17	7.75	20.30
I ₃ O ₁ B ₃	100%NPK + FYM 10t/ha + Azotobacter2.5kg/ha +PSB2.5kg/ha	87.87	58.80	31.30	118.50	8.44	20.17
I ₃ O ₂ B ₁	100%NPK + FYM 20 t/ha +Azotobacter 5kg/ha	88.11	58.82	32.82	117.13	8.08	20.98
I ₃ O ₂ B ₂	100%NPK + FYM 20 t/ha + PSB 5kg/ha	92.05	59.46	33.33	117.10	8.37	21.53
I ₃ O ₂ B ₃	100%NPK + FYM 20 t/ha + PSB 2.5kg/ha+ Azotobacter 2.5kg/ha	91.04	59.02	32.33	118.00	9.11	22.64
SEm+-		1.909	1.606	1.129	0.915	0.223	0.519
CD		5.386	4.530	3.186	2.850	0.629	1.577

Table 2: Impact of biofertilizers, NPK and FYM on quality attributes of potato.

Treatment Symbol	Treatments	Starch%	Protien%	Reducing sugars	TSS%	Dry matter%
I ₁ O ₁ B ₁	50% NPK + FYM 10 t/ha + Azotobacter 5kg/ha	22.55	1.54	35.49	5.41	21.32
I ₁ O ₁ B ₂	50% NPK + FYM 10 t/ha + PSB 5kg/ha	21.62	1.47	36.02	5.29	22.23
I ₁ O ₁ B ₃	50%NPK+FYM 10t/ha+Azotobacter 2.5kg/ha +PSB 2.5kg/ha	22.38	1.75	36.06	5.42	22.08
I ₁ O ₂ B ₁	50%NPK +FYM 20 t/ha + Azotobacter 5 kg/ha	22.47	1.48	37.73	5.47	22.26
I ₁ O ₂ B ₂	50%NPK + FYM 20 t/ha + PSB 5 kg/ha	23.50	1.68	36.40	5.60	23.20
I ₁ O ₂ B ₃	50%NPK+FYM20t/ha+Azotobacter2.5kg/ha+PSB 2.5kg/ha	24.94	1.97	39.17	5.48	22.55
I ₂ O ₁ B ₁	75%NPK + FYM 10t/ha + Azotobacter 5kg/ha	23.48	1.71	39.49	5.29	22.52
I ₂ O ₁ B ₂	75%NPK + FYM 10 t/ha + PSB 5kg/ha	24.35	1.90	39.57	5.64	21.69
I ₂ O ₁ B ₃	75%NPK + FYM 10 t/ha+Azotobacter2.5kg/ha +PSB2.5kg/ha	23.93	1.90	38.37	5.48	22.86
I ₂ O ₂ B ₁	75%NPK+ FYM 20 t/ha + Azotobacter 5kg/ha	24.96	1.75	39.51	5.97	21.98
I ₂ O ₂ B ₂	75%NPK + FYM 20 t/ha + PSB 5kg/ha	24.91	2.13	38.79	5.80	21.93
I ₂ O ₂ B ₃	75%NPK + FYM 20 t/ha + Azotobacter 2.5kg/ha+ PSB 2.5kg/ha	26.15	1.87	37.78	5.53	23.69
I ₃ O ₁ B ₁	100% NPK + FYM 10t/ha +Azotobacter 5kg/ha	26.46	1.94	41.08	6.04	23.22
I ₃ O ₁ B ₂	100%NPK + FYM 10t/ha +PSB 5kg/ha	26.15	2.02	41.33	5.88	23.93
I ₃ O ₁ B ₃	100%NPK + FYM 10t/ha + Azotobacter2.5kg/ha +PSB2.5kg/ha	26.57	1.81	41.33	6.17	23.50
I ₃ O ₂ B ₁	100%NPK + FYM 20 t/ha +Azotobacter 5kg/ha	26.75	2.36	41.83	5.72	24.05

I ₃ O ₂ B ₂	100%NPK + FYM 20 t/ha + PSB 5kg/ha	26.77	2.08	40.77	6.01	23.93
I ₃ O ₂ B ₃	100%NPK + FYM 20 t/ha + PSB 2.5kg/ha+ Azotobacter 2.5kg/ha	26.15	1.94	39.70	5.72	23.97
SEm+-		0.641	0.053	1.00	0.158	0.599
CD		1.906	0.159	3.123	0.446	1.862

References

1. Barman KS, Ram B, Verma RB. Effect of Integrated nutrient management on growth and tuber yield of potato (*Solanum tuberosum*) cv. Kufri Ashoka, Trends in Biosciences. 2014; 7(9):815-817.
2. Gavit Chandrakala, Varsha A. The influence of organic manures and inorganic fertilizers on growth and yield of potato. Contemporary Research in India. 2010; 6(2):57-60.
3. Horticultural Statistics at a Glance, Government of India, 2017.
4. Jaipaul, Sharma, Sanjeev, Sharma K. Effect of organic fertilizers on growth, yield and quality of potato under rainfed conditions of central Himalayan region of Uttarakhand. Potato J. 2011; 38(2):176-181.
5. Jatav AS, Kushwah SS, Naruka IS. Performance of Potato Varieties for Growth, Yield, Quality and Economics under Different Levels of Nitrogen Advances in Research. 2017; 9(6):1-9.
6. Kumar Parveen, Kumar Rajeev, Kumar Dinesh, Singh Sukhwinder, Sandhu KS, Singh BP. Fertilizer management of potato (*Solanum tuberosum*) variety Kufri Frysona for higher yield, good fry quality, profitability and Storability. Ann. Agric. Res. New Series. 2015; 36(2):191-199.
7. Sharma Sanjeev, Jaipaul, Sharma Ashok. Effect of Organic Fertilizers on Growth, Yield and Quality of Potato under Rainfed Conditions of Central Himalayan Region of Uttarakhand. Potato Journal. 2011; 38(2):176-181.
8. Panse VG, Sukhatme PV. Statistical methods, for agricultural workers. Fourth edition. ICAR Publication, New Delhi, 1985.
9. Marwaha. Evaluation of advanced potato hybrid MP/97-644 and processing varieties for yield and chipping quality in north-eastern hills. Indian J. Hort. 2009; 66(3).
10. Khurana SC, Bhutani RD. Effect of FYM, biofertilizers and inorganic fertilizers on potato. The Indian Potato Association. 2005; 32(3-4):242.
11. Ram B, Singh BN, Kumar H. Impact of various organic treatments on growth, yield and quality parameters of potato. International Journal of Pure and Applied. Bioscience. 2017; 5(3):643-647.
12. Singh V, Singh S, Singh H. Effect of balanced fertilization on nutrient uptake, yield and profits with potato in partially reclaimed sodic soil, Annals of Plant and Soil Research. 2010; 12(2):83-85.
13. Yadav SK, Bag TK, Srivastava AK. Effect of Organic Manure and Biofertilizers on system Productivity and Profitability of Potato (*Solanum tuberosum*): French bean (*Phaseolus Vulgaris*) Cropping system. Indian Journal of Agronomy. 2017; 62:221-226.