

RESPONSE OF VERMICOMPOST AND PSB ON THE VEGETATIVE GROWTH AND YIELD OF ONION (*Allium cepa* L.)

ABSTRACT

A field experiment was conducted during rabi season of 2020-21 at research farm R.B.S. College, Bichpuri, Agra (U.P) to study the “Response of Vermicompost and PSB on the vegetative growth and yield of onion (*Allium cepa* L.)” there were 7 treatment combinations in field layout with randomized block design. T₁ 100% RDF (Control), T₂ 80% RDF+PSB (5kg/ha.), T₃ 80% RDF+VC, T₄ 80% RDF+VC+ PSB (5kg/ha.), T₅ 100 %RDF+PSB (5kg/ha.), T₆ 100% RDF+VC (5kg/ha.) and T₇ 100% RDF+VC+ PSB (5kg/ha.). which were replicated thrice On the basis of experiment conducted that the treatment T₇ i.e, application 100% RDF+VC+ PSB (5kg/ha.) was found superior among the treatments for growth and yield of onion, the maximum bulb yield (332.64 q/ha) was obtained by application of treatment T₇ 100% RDF+VC+ PSB (5kg/ha.).

Keywords: Nitrogen, Phosphorus, Potassium, Vermicompost, PSB and Onion

INTRODUCTION

Onion (*Allium cepa* L.) herbaceous biennial plant in the amaryllis family (Amaryllidaceae) grown for its edible bulb is one of the most important vegetable crop commercially grown in the world. The word “onion” is derived from Latin language means “large pearl”. It probably originated from Central Asia between Turkmenistan and Afghanistan. The crop onion is a popular vegetable and its bulb is used raw, sliced for seasoning salads, and cooked with other vegetables and meat. Onion bulbs are essential ingredients in many African sauces and dishes. The leaves, whole immature plants called ‘salad onion’ or leafy sprouts from germinating bulbs are used in the same way. Onion contains carbohydrates (11.0 g), fiber (0.6 g), moisture (86.8 g) and several vitamin like vitamin C (11 mg), thiamin (0.08 mg) and niacin (0.2 mg) and also some minerals like phosphorus (39 mg), calcium (27 mg), sodium (1.0 mg), iron (0.7 mg) and potassium (157 mg) per 100 g. Amongst bio-fertilizers, PSB strains play a key role in harnessing the atmospheric phosphorus through its fixation in the roots. They have solubilizing inorganic phosphorus from insoluble compounds. P-solubilization ability of rhizosphere microorganisms is considered to be one of the most important traits associated with plant phosphate nutrition. Vermicompost has large particulate surface area that provides many micro sites for the microbial activity and strong retention of

nutrients. Vermicompost also contains large amounts of humus substances and some of the effects of these substances on plant growth have been shown to be very similar to those of soil applied plant growth regulators or hormones. As a result, most nutrients are easily available such as; nitrates, phosphates, and exchangeable calcium and soluble potassium, which are responsible for increased plant growth and crop yield.

METHODS AND MATERIALS

The field experiment was conducted at the RBS College, Agricultural Research Farm, Bichpuri (Agra), which is situated at an elevation (altitude) of 168 m above mean sea level, 27.2⁰ N latitude and 77.9⁰ E longitude. Bichpuri farm is located at about 11 km. away from Agra city on Agra-Bharatpur Road, in semi-arid region IV (AESR 4.1) and Agro-climatic Zone 'NWPZ' (North Western Plains Zone)

Agra enjoys semi-arid, sub-tropical climate with extremes of temperature both in winter and summer. The winter (December to January) is severe cold with minimum temperature at two degree Celsius (1-2⁰C) and in summer (May-June) the temperature often goes up to 46⁰-48⁰C accompanied with hot desiccating winds. The details of different treatments using in experiment are given below

T ₁	100% Recommended dose of fertilizer (Control)
T ₂	80% RDF+ Phosphate solubilizing bacteria (5kg/ha.)
T ₃	80% RDF+Vermicompost
T ₄	80% RDF+VC+ PSB (5kg/ha.)
T ₅	100 %RDF+PSB (5kg/ha.)
T ₆	100% RDF+VC (5kg/ha.)
T ₇	100% RDF+VC+ PSB (5kg/ha.)

RESULTS AND DISCUSSION:

The pooled data regarding vegetative growth and yield of onion were presented in Table-1 and Table-2. The data Table-1 indicated that the T₇ (100%RDF+VC+PSB) treatment had the maximum fresh weight of tops (22.78gm) at harvest which was significantly at par with T₆ treatment where as minimum fresh weight of tops (18.43gm) was recorded in T₁ (100% RDF) treatment in this parameter. The data also indicated that the T₇ (100%RDF+VC+PSB) treatment had the maximum fresh weight of bulb (80.71 gm) at harvest which was superior to all other treatments however, treatment T₆ was statistically at par with T₇ while minimum fresh weight of bulb (65.78

gm) was obtained with T₁ (100% RDF). Diameter of bulb at harvest presented in the table showed that the treatment (100%RDF+VC+PSB) T₇ produced (6.43cm) significantly maximum diameter of bulb followed by T₆ which was statistically at par to each other. However rest of all treatments statistically less than T₇. The results are in agreement with the work of Yogita *et al.* (2012) and Kumar *et al.* (2010). The significantly maximum Plant height at 30,60 and 90 DAT was recorded with the treatment T₇ [100%RDF+VC+PSB (each 5kg/ha.)]. which was closely followed by T₅ and T₆ at 30,60 and 90 DAT. However the minimum plant height was noted under the treatment T₁ (100% RDF) at 30, 60 and 90 DAT. Possible reason for increased height of plant may be due to the improvement in growth related attributes because of certain growth promoting substances secreted by bio-fertilizers, better uptake of water, nutrients and their transportation. Similar studies were also conducted by Mandal *et al.* (2013) and Bringham *et al.* (2014) in onion crop. The maximum bulb yield per plot and per hectare (6.28kg and 332.64q, respectively) was recorded in treatment [100%RDF+VC+PSB (each 5kg/ha.)] T₇ which was statistically at par with T₅ and T₆. Whereas, the minimum bulb yield (3.59 kg/plot) and (190.56q/ha) was obtained in T₁. This increase may be due to more number of bulbs per plot, bulb size and average weight of bulbs. Number of leaves per plant and diameter of pseudo-stem (cm) were appreciably higher with treatment T₇ [100%RDF+VC+PSB (each 5kg/ha.)] over all other treatments. Significantly maximum diameter of Onion bulb was found in treatment T₇ [100%RDF+VC+PSB (each 5kg/ha.)] while the minimum was noted with T₁ at 90 DAT and harvest stage.

Table-1 Effect of Fresh weight of tops (gm), Fresh weight of bulb and Diameter of bulb (cm)

Treatment	Plant height (cm)	No. of green leaves per plant	Fresh weight of tops (gm)	Fresh weight of bulb (gm)	Diameter of bulb (cm)
100% RDF(control)	39.76	5.97	18.43	65.78	4.96
80% RDF+PSB	44.11=	6.32	20.45	76.03	5.76
80% RDF+VC	44.11	6.50	20.91	76.35	5.83
80% RDF+VC +PSB (each 5kg/ha.)	41.29	6.10	19.2	75.20	5.27
100% RDF +PSB	42.1	6.30	20.17	75.35	5.67
100% RDF+VC	46.82	6.93	22.6	77.83	6.09
100%RDF+VC+PSB (each 5kg/ha.)	48.14	7.40	22.78	80.71	6.43
S.Em±	0.78	0.21	0.48	1.13	0.13
C.D.(P=0.05)	2.35	0.64	1.15	3.39	0.39

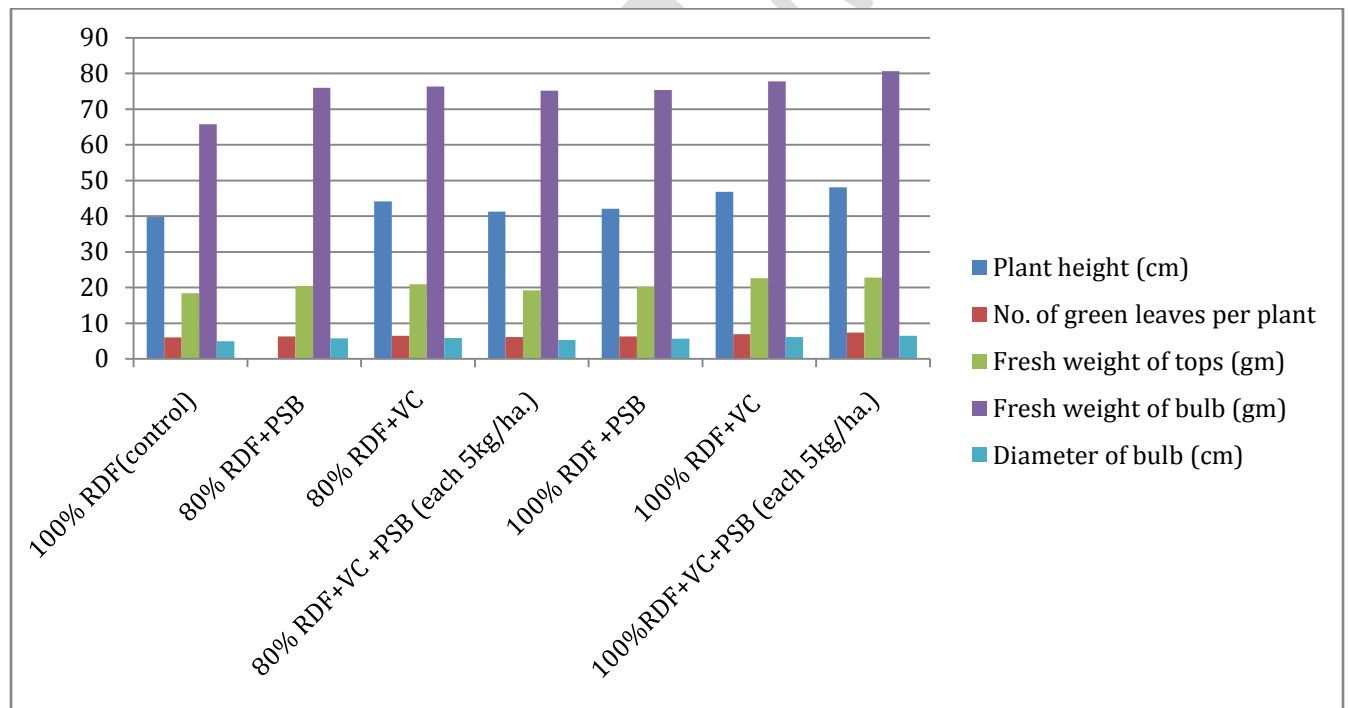


Fig. 1 Effect of Fresh weight of tops (gm), Fresh weight of bulb and Diameter of bulb (cm)

Table 2- Effect of Fresh weight of bulb (kg/plot), Dry matter content of bulb (%) and Total bulb yield (q/ha).

Treatment	Fresh weight of bulb (kg/plot)	Dry matter content of bulb (%)	Total bulb yield (q/ha)
100% RDF(control)	3.59	9.78	190.56
80% RDF+PSB	4.30	10.45	228.12
80% RDF+VC	4.43	10.67	234.64
80% RDF+VC +PSB (each 5kg/ha.)	3.76	10.12	199.23
100% RDF +PSB	3.91	10.47	207.23
100% RDF+VC	5.96	10.91	315.94
100%RDF+VC+PSB (each 5kg/ha.)	6.28	11.05	332.64
S.Em_±	0.26	1.01	8.06
C.D.(P=0.05)	0.78	NS	24.17

The maximum fresh weight of bulb was obtained with the application of treatment T₇ [100%RDF+VC+PSB (each 5 kg/ha.)], which was significantly higher over rest of the treatments. Application of treatment T₇ [100%RDF+VC+PSB (each 5kg/ha.)] gave maximum Dry matter content of bulb (8.97%) which was considerably higher over rest of the treatments.

CONCLUSION

On the basis of present investigation, following conclusions were drawn: maximum bulb yield (332.64) Q ha⁻¹ was obtained by application of treatment T₇ [100%RDF+VC+PSB (each 5kg/ha.)]. On the basis of experiment conducted, it is concluded that the treatment T₇ i.e., application of [100%RDF+VC+PSB (each 5kg/ha.)] was found superior among all other treatments for growth and yield characters of onion. maximum bulb yield (332.64) Q ha⁻¹ was obtained by application of treatment T₇ [100%RDF+VC+PSB (each 5kg/ha.)]

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