

Original Research Article

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Influence of Enriched Button Mushroom Spent Compost on Growth and Yield of Cabbage

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ABSTRACT

Keywords

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The investigations on Influence of enriched button mushroom spent compost on growth of cabbage were carried at Plant Pathology Section, College of Agriculture, Pune during *rabi* 2018. The treatment with button mushroom spent compost + *Azotobacter* @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha proved to be best among all treatments in respect to growth parameters such as root length at harvest, green weight (deheaded) and dry weight of whole plant (deheaded). Highest yield of cabbage (1.1 kg) and diameter of cabbage (15.87 cm) was recorded in this treatment. This was followed by treatment with button mushroom spent compost + *Azotobacter*@10 kg/ha + P.S.B. @10 kg/ha in respect to yield i.e. weight of head (0.94 kg) and diameter of head (14.83cm). The minimum yield i.e. weight of head (0.55kg) and diameter of cabbage (11.47 cm) were recorded in control treatment i.e. without button mushroom spent compost.

Introduction

Cabbage (*Brassica oleracea* var. *capitata* L.) is one of the most important cole crops grown under temperate to tropical climate conditions in more than ninety countries throughout the world (Singh *et al.*, 2010). The compost left after the harvest of one full crop of mushroom, beyond which extension of crop becomes unremunerative is called as the 'spent

mushroom substrate' (SMS) (Ahlawat and Sagar, 2007). The growing substrates are composted from different waste materials such as sawdust, rice straw, cotton wastes, paper wastes, cocoa shells, wheat straw, maize husks and various other wastes (Jonathan *et al.*, 2002).

During the last few years, the use of chemical fertilizers is increasing for getting higher

production of crops. The increased use of inorganic fertilizer is causing soil pollution and lessening the productivity by causing deterioration of soil structure. The continuous and imbalanced uses of chemical fertilizers lead to decreases the nutrient uptake and adversely affect the quality of produce (Agarwal, 2003).

Button mushroom spent compost is not fully decomposed hence decomposing culture can be used to fasten the process of decomposition of spent button mushroom compost. It helps to release the nutrients from button mushroom spent compost easily.

Considering the importance and vast use of spent mushroom compost it has been decided to improve the quality of button mushroom spent compost by enriching it with biofertilizers rather using only button mushroom spent compost for cabbage production. Hence the experiment on influence of enriched button mushroom spent compost on growth of cabbage was planned.

Materials and Methods

Experimental details

The field trial was conducted at experimental field of Plant Pathology Section, College of Agriculture, Pune during *rabi* 2018 as detailed below.

Replications: Three (3)

Treatments: Nine (9)

Design: Randomised Block Design

Spacing: 45 cm X 30 cm

Variety: Euro-2

Fertilizer dose: 160:80:80kgNPK/ha

Button mushroom spent compost application rate: 20 T/ ha

Treatments details: as listed under table 1 and 2.

During the experiment, the observations were recorded on growth and yield parameters *viz.*, root length at harvest, green weight and dry weight of whole plant (deheaded), diameter and the yield of cabbage head (kg per plant) and analysed statically.

Results and Discussion

Green weight of whole plant (deheaded and dry matter weight of whole plant)

The green weight of deheaded whole plant was recorded immediately after harvest of head. Dry matter weight of whole plant is also recorded. The results were recorded and presented in Table 1.

Green weight of whole plant (deheaded)

The data described in Table 1 revealed that treatment T₇ i.e. Button mushroom spent compost + *Azotobacter* @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha had higher green weight of deheaded whole plant immediately after harvesting (594.87 g).

This was followed by treatment T₆ i.e. button mushroom spent compost + *Azotobacter*@10 kg/ha + P.S.B. @10 kg/ha (589.33 g). The lowest (462 g) green weight of deheaded whole plant immediately after harvesting was recorded in treatment T₉ i.e. Control (without button mushroom spent compost).

The results are in conformity with work of Espiritu (2011) who reported that fresh and dry weight of pechay were significantly increased by combined inoculation of *Azotobacter* sp. and *T. harzianum*.

Dry matter weight of whole plant

The data shown in Table 1 revealed that treatment T₇ i.e. button mushroom spent compost + *Azotobacter* @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha had higher dry matter weight of whole plant at 15 days of transplanting (74.76g) followed by treatment T₆ i.e. button mushroom spent compost + *Azotobacter*@10 kg/ha + P.S.B. @10 kg/ha (65.51g). The lowest (51.7 g) dry matter weight of whole plant at 15 days after transplantation was recorded in treatment T₉ i.e. Control (without button mushroom spent compost). The results were parallel with findings of Espiritu (2011) who reported that fresh and dry weight of pechay were

significantly increased by combined inoculation of *Azotobacter* sp. and *T. harzianum*.

Root length at harvest

The maximum root length at harvest (17.70 cm) was recorded in treatment T₇ i.e. button mushroom spent compost + *Azotobacter* @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha followed by treatment T₆ i.e. button mushroom spent compost + *Azotobacter*@10 kg/ha + P.S.B. @10 kg/ha (17.41cm) while minimum root length at harvest (16.10 cm) is recorded in treatment T₉ i.e. control (without button mushroom spent compost).

Table.1 Effect of enriched button mushroom spent compost on growth of cabbage

Treatments		Green weight (g) (deheaded)	Dry matter weight(g)	Root length (cm)
T ₁	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha	482.00	53.38	16.77
T ₂	Button mushroom spent compost + Phosphate Solubilizing Bacteria (P.S.B.) @10 kg/ha	481.33	52.66	16.67
T ₃	Button mushroom spent compost + Decomposing culture @ 20 kg/ha	472.67	52.05	16.67
T ₄	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha + Decomposing culture @ 20 Kg/ha	558.00	58.35	16.90
T ₅	Button mushroom spent compost + P.S.B. @10 kg/ha + Decomposing culture @ 20 kg/ha	504.00	53.91	16.87
T ₆	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha + P.S.B. @10 kg/ha	589.33	65.51	17.41
T ₇	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha	594.87	74.76	17.70
T ₈	Only Button mushroom spent compost (without biofertilizers)	470.67	51.9	16.33
T ₉	Control (Without button mushroom spent compost)	462.00	51.7	16.10
SEm (±)		12.65	2.18	0.41
CD (5%)		38.25	6.61	N.S.

Table.2 Effect of enriched button mushroom spent compost on diameter and yield of head of cabbage

Treatments		Diameter of head (cm)	Yield :weight of head (kg)
T ₁	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha	12.80	0.68
T ₂	Button mushroom spent compost + Phosphate Solubilizing Bacteria (P.S.B.) @10 kg/ha	12.53	0.62
T ₃	Button mushroom spent compost + Decomposing culture @ 20 kg/ha	12.43	0.60
T ₄	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha + Decomposing culture @ 20 Kg/ha	14.27	0.87
T ₅	Button mushroom spent compost + P.S.B. @10 kg/ha + Decomposing culture @ 20 kg/ha	13.90	0.79
T ₆	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha + P.S.B. @10 kg/ha	14.83	0.94
T ₇	Button mushroom spent compost + <i>Azotobacter</i> @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha	15.87	1.10
T ₈	Only Button mushroom spent compost (without biofertilizers)	12.17	0.59
T ₉	Control (Without button mushroom spent compost)	11.47	0.55
SEm (±)		0.33	0.04
CD (5%)		1.01	0.11

The results obtained were comparable to the findings of Unal (2015) who reported that the values of hypocotyl length, seedling length, seedling root length, shoot fresh weight and root fresh weight of tomato gave the best results in the seedlings grown in 100% spent mushroom compost. Also, the results were similar with work of Sudjana *et al.*,(2017) who reported that the use of enriched compost with N fixing microbe and P solubilizing could provide better plant performance as compared to without compost or without enriched compost. In present investigation too, the crop had performed better under application of button mushroom spent compost enriched with bioinoculants as compared to treatments non-enriched T₈ as well as control (without button mushroom spent compost).

Yield

The diameter of head and weight of head were noted immediately after harvest of cabbage crop. The results were recorded and presented in the Table 2.

Diameter of head

The diameter of head of cabbage was recorded at harvesting. The maximum diameter (15.87cm) of head of cabbage was recorded in treatment T₇ i.e. button mushroom spent compost + *Azotobacter* @10 kg/ha +P.S.B @10 kg/ha + Decomposing culture@ 20 kg/ha which is followed by treatment T₆ i.e. button mushroom spent compost + *Azotobacter*@10 kg/ha + P.S.B. @10 kg/ha (14.83cm). Minimum diameter (11.47cm) of head of

cabbage was recorded in T₉ i.e. Control (Without button mushroom spent compost).

The results obtained were in agreement to Ahlawat *et al.*, (2006) who stated that SMC enhances the stalk length (5.10 cm), curd length (12.25 cm) and curd diameter (15.17 cm) in cauliflower.

Weight of head

The highest (1.1 kg) yield of cabbage head was recorded in treatment T₇ i.e. button mushroom spent compost + *Azotobacter* @10 kg/ha + P.S.B @10 kg/ha + Decomposing culture @ 20 kg/ha. This was followed by treatment T₆ (button mushroom spent compost + *Azotobacter*@10 kg/ha + P.S.B. @10 kg/ha) wherein head had weighed 0.94 kg.

Both of these treatments are statistically at par with each other. Lowest (0.55 kg) yield was recorded in T₉ i.e. control (without button mushroom spent compost).

The results were parallel with work of Taha *et al.*, (2018) who recorded that PGPR-bacteria +SMC (Spent Mushroom Compost) tea and KH (Potassium Humate) were present within the soil can reduce the requirement of nitrogen fertilizer applications and lead to higher yield of tomato.

Yildirim *et al.*, (2009) reported that the use of the inoculant (*Azotobacter* + *Pseudomonas*) on compost used as cauliflower growing medium provided high-yield of crop and highest plant weight compared to that without enrichment or singly enrichment.

The results obtained were comparable to the findings of Ahlawat *et al.*, (2007) who reported SMC enhances fruit yield (71 q/ha) in comparison to farm yard manure and the recommended dose of fertilizers (52.5 q/ha) in chilli. Similar findings were reported by

Sangwan *et al.*, (2002) who got the highest yield of wheat in the treatment receiving SMC + 100% recommended dose of chemical fertilizers.

Indian agriculture needs substitute for FYM, the present experiment shows that button mushroom spent compost can be used as substitute for FYM or organic manure. The experiment was conducted to study the influence of enriched button mushroom spent compost on growth of cabbage.

It had shown how to improve the quality of button mushroom spent compost by enriching it with biofertilizers like *Azotobacter*, PSB and decomposing culture. The present research revealed significant results from which it can be concluded that

1. The application of button mushroom spent compost enriched with *Azotobacter*, PSB and decomposing culture exhibited better influence on growth parameters like root length, green weight and dry matter weight of cabbage. This enriched button mushroom spent compost showed profound influence on diameter of head and yield of cabbage crop.

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