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Productivity enhancement of Cabbage through Nutrient management in Ratoon crop

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ABSTRACT

A three years field experiment was conducted under Krishi Vigyan Kendra (KVK), Baksa during 2018-19, 2019-20, 2020-21 to evaluate the productivity enhancement of Cabbage through Nutrient management in Main and Ratoon crop. The results revealed that treatment with 100% recommended fertilizer dose (RFD) in Main crop and 50% RFD in Ratoon crop was found to contribute more yield attributing parameters and final yield in cabbage cultivation among all other treatments. The yield attributing parameters in respect to average head weight (816 g), average head diameter (18.20 cm) and days to sprouting (5.1 days) were more in 50% RFD ratoon crop in comparison to 25% RFD in ratoon crop (626 g, 16.30 cm and 8.2 days) and farmers practices (597 m, 13.40 cm and 10.7 days) respectively. Treatment with 100% RFD in Main crop and 50% RFD in Ratoon crop contributed highest final average yield (45.60 t h⁻¹) with B:C ratio (3.52) in comparison to (39.33 t h⁻¹ and 3.33) (25 t h⁻¹ and 2.77) in 100% RFD in Main crop and 25% RFD in Ratoon crop and farmers practices respectively. The Net return (489.94 ⁰⁰⁰h⁻¹) achieved from 100% RFD in Main crop and 50% RFD in Ratoon crop was also found highest as compared to other two treatments (Rs. 412.70 ⁰⁰⁰h⁻¹) and (Rs. 239.73 ⁰⁰⁰h⁻¹) respectively.

Key words : Cabbage, Ratoon crop, Fertilizer dose, Yield, Economics

Introduction

Cabbage is commonly cultivated in Plateau State, Nigeria and widely consumed raw and cooked by humans for vitamin and mineral nutrition (FAO, 2000). Cabbage comes under important cole crops and one of the most extensively grown leafy vegetables in Baksa district during rabi season. Cabbage is mostly preferred vegetable due to its high nutritive value with high market demand. India covers an area of 400 thousand ha with production 9127 thousand tones during 2018-19 (Agricultural Situation in India, 2020). The *District Baksa* is a newly reorganised *district* under Bodoland of Assam. Near

about 5.4 thousand ha area land is under rabi vegetable cultivation with annual production 79.16 thousand metric tons (District Contingency Plan, 2016). Ratooning in cabbage is a natural phenomenon and very little information is available on ratooning in cabbage and economic return of cabbage cultivation as ratoon crop. Due to absence of information on nutrient management in Ratoon crop in cabbage, farmers are unable adopt appropriate method for its large scale commercial cultivation. Considering the above facts, the present study was undertaken to evaluate the yield and benefit costs from cabbage cultivation as Main and Ratoon crop in responds to various levels of fertilizer application.

Materials and Methods

The experiment was conducted at Farmers field under Krishi Vigyan Kendra (KVK) Baksa, Assam during 2018-2020. The soil of the experimental area was Alluvial and Sandy loam soil and medium high. Cabbage variety KSP-99 (Hybrid) was considered for the experiment with three treatments on nutrient management both in Main and Ratoon crop as mentioned below keeping farmers practice as control. Inorganic fertilizers under nutrient management were applied in the form of Urea, SSP and MOP.

Treatments

T₁ Main Crop with 100% Recommended Fertilizer Dose (RFD) without Ratooning

T₂ Main Crop (100% RFD)+ Ratoon crop with 50% Recommended Fertilizer Dose (RFD)

T₃ Main Crop (100% RFD) + Ratoon crop with 25% Recommended Fertilizer Dose (RFD)

T₀ Farmers practice (Control) with Ratooning

The twenty five day old healthy and uniform sized with 6 leaves stage with 6 leaves (Choudhary *et al.*, 2009) Cabbage seedlings were transplanted in the experimental plots (3m x 3m) in the month of August maintaining a spacing of 60 cm x 60cm in a Randomised Block Design (RBD) replicated four times to give a total of 16 plots in the experiment.. All good agricultural practices like irrigation, intercultural operation and insect pest management were followed to have a good crop. Harvesting operation of Main crop was performed in the month of November in every three consecutive years. To obtain a good Ratoon crop, cabbage head was cut with a sharp knife leaving two loose leaves at the base of the stump. Ratoon crop was harvested in the month of January in every three consecutive years. Data on yield attributing characters like head weight, Head diameter, stalk length and sprouting time both for Main and Ratoon crop were recorded plot wise carefully for every three years. Collected data on yield attributing characters and economic return were then converted into per hectare and were computed as per the procedure of Alam *et al.* (1989). To determine the optimum cabbage yield, the gross cost, net income and benefit: cost ratio were estimated for the various treatments as outlined by Erhabor (2005). The obtained data were statistically analyzed in SPSS computer based software.

Results and Discussion

A three years field experiment was conducted under Krishi Vigyan Kendra (KVK), Baksa during 2018-19, 2019-20, 2020-21 to evaluate the productivity enhancement of Cabbage through nutrient management in Ratoon crop. The results revealed that T₂ with 100% recommended fertilizer dose (RFD) in Main crop and 50% RFD of N:P:K in Ratoon crop was found to contribute more yield attributing parameters and final yield in cabbage cultivation among all other treatments (Table 1) which is in conformity with the findings of Verma and Verma, 2008 and Muhammad *et al.*, 2007 that fertilizers provide macro and micro nutrients essential for plant growth and yield of cabbage.

The yield attributing parameters in respect to average head weight (816gm), average head diameter (18.20 cm) and sprouting (5.1 days) were more in T₂ in comparison to T₃ (626 g, 16.30 cm and 8.2 days) and T₀ (597g, 13.40 cm and 10.7 days) respectively (Table 1). This experiment revealed that fertilizer is important for cabbage production because the control treatment consistently furnished significantly lowest values for all measured parameters. Similarly, Choudhary and Choudhary (2005) stated that vegetative parameters of cabbage increased considerably with increasing nitrogen rates. This may have resulted from the quick release of readily available nutrients characteristic of inorganic fertilizers. Furthermore, cabbage being a heavy consumer of nutrients that confirmed the present findings (Choudhary *et al.*, 2009).

Treatment T₂ with 100% RFD in Main crop and 50% RFD in Ratoon crop contributed highest final average yield (45.60 t h⁻¹) in comparison to 39.33 t h⁻¹ and 25t h⁻¹ in T₃ with 100% RFD in Main crop and 25% RFD in Ratoon crop and control plot respectively (Table 1). Increased in yield of cabbage significantly with each successive input of inorganic fertilizer is consistent with report by Meena and Paliwa (2003) that increase in yield parameters corresponded with increase in levels of fertilizer application.

The costs including harvesting of the crop were recorded for all the treatments and calculated on per hectare basis (Table 2). The total cost of production of Main crop ranged between Rs. 99.07 thousand to Rs. 132.04 thousand ha⁻¹ and were remained same for treatment T₂ and T₃. The cost of production in

Table 1. Average yield attributing parameters and yield in Main and Ratoon crop

Treatments	Head weight (gm)	Head diameter (cm)	Stalk Length (cm)	Sprouting time (Days)	Yield(t/ha)		Gross yield
					Main	Ratoon (t/ha)	
T ₁	1160	23.50	12.20	-	26.11	00	26.11
T ₂	816	18.20	5.50	5.10	26.12	19.48	45.60
T ₃	626	16.30	7.30	8.20	26.11	13.22	39.33
T ₀	597	13.40	8.50	10.70	15.45	9.55	25.00
LSD	2.61	2.26	1.92	-	-	-	2.29

Data are the mean of three years

Table 2. Economics of Main and Ratoon crops

Treatments	Gross cost (000, Rs./ha)			Gross Return (000, Rs/ha)			Net income (000,Rs/ha)	B:C Ratio
	Main	Ratoon	Total	Main	Ratoon	Total		
T ₁	132.04	-	132.04	522.20	-	391.65	259.61	2.97
T ₂	132.04	62.02	194.06	522.40	389.60	684.00	489.94	3.52
T ₃	132.04	45.21	177.25	522.20	264.40	589.95	412.70	3.33
T ₀	99.07	36.20	135.27	309.00	191.00	375.00	239.73	2.77
LSD	-	-	2.94	-	-	3.19	-	-

Data are the mean of three years * Considering selling @ Rs. 15/- per kg

Ratoon crop varies from Rs.36.20 thousand to Rs. 62.02 thousand ha⁻¹, the variation was due to the cost of different fertilizer dose (Table 2). The total production cost was the lowest (Rs. 132.04 thousand ha⁻¹) for the T₁ and the highest (Rs. 194.06 thousand ha⁻¹) for T₂ treated plots. The gross return from different treatments ranged between Rs. 475 thousand to Rs.684 thousand ha⁻¹ and mentioned in Table 2. Gross return was the total income through sale of cabbage marketable yield @ Rs. 15/-. The highest net return Rs. 489.94 thousand per ha was obtained from T₂ treatment followed by T₃ treatment Rs. 412.70 thousand per ha (Table 2). While the lowest net return Rs. 239.73 thousand per ha was found from the control plot. This result is in agreement with the finding of Farid *et al.* (1998) who reported that economically more profit was found when inorganic fertilizer were applied together in cabbage cultivation. Benefit: cost ratio, an indication of the returns per naira invested was also greater than 1.0 at all treatments. The benefit cost ratio was found to be the highest (3.52) in treatment T₂. The second and third highest benefit cost ratio (3.33 and 2.97) was found in T₃ and Main crop without Ratooning respectively, while the lowest (2.77) benefit cost ratio was recorded from the control plot.

From the economic point of view, the above result indicated that treatment T₂ was more profitable than other treatments in both Maina and Ratoon

crop of cabbage. From the study, it is apparent that among the different fertilizer management practices, the T₂ treatment showed the best performance (45.60 t ha⁻¹) for ratoon crop of cabbage. The second best results (39.33 t ha⁻¹). in T₃, compared to control

Conclusion

In the current study, cabbage fertilized with 100% RFD in main crop and 50% RFD in Ratoon rendered the highest growth and yield values. Cabbage parameters increased significantly with successive increases of NPK dose (25, 50 and 100 kg ha⁻¹) implying a linear response which had the highest benefit: cost ratio as compared to farmers practices.

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