TERMINAL REPORT

EFFICACY TRIAL FOR REGISTRATION OF ULTRABOOST AS FOLIAR FERTILIZER FOR PECHAY (*Brassica rapa* L.)

Location:

Barangay Licaong
Science City of Munoz, Nueva Ecija

June 2023 to August 2023

EFFICACY TRIAL FOR REGISTRATION OF ULTRABOOST AS FOLIAR FERTILIZER FOR PECHAY (*Brassica rapa* L.)

Constancia C. Dacumos [1] and Mary Piel A. Paulo [2]

ABSTRACT

This efficacy trial was conducted to determine the effect of ULTRABOOST applied as foliar fertilizer on the growth and yield of pechay (*Brassica rapa* L.). It was conducted from June 2023 to August 2023 at Barangay Licaong, Science City of Muñoz, Nueva Ecija.

Application of recommended rate (RR) of ULTRABOOST at the rate of 2.3ml applied before planting by soil application and 7 days after emergence by foliar spray in combination with the recommended rate of inorganic fertilizer (RRIF) at the recommended rate of 150-40-75 kg N P_2O_5 K_2O applied as basal and 15 after planting (DAP) by broadcast application produced the tallest plants (15.79cm) at 25 DAP, longest leaf length (9.10cm) and widest leaf width (8.14cm) at 25 DAP. This obtained the heaviest weight of each pechay plant at 30 DAP or at harvest (97.53g). In terms of kg/ha and tons/ha, application of RR of ULTRABOOST combined with RRIF produced 24383.33 kg/ha and 24.38 tons/ha, respectively while the untreated control obtained the lowest with 7108.33 kg/ha or 7.11 tons/ha. The effect of producing the heaviest weight of each pechay plant at harvest through the application of RR of ULTRABOOST with recommended rate of inorganic fertilizer (RRIF) having 97.53g was comparable with the application of RR of ULTRABOOST combined with ½ of recommended rate of inorganic fertilizer (RRIF) having 85.53g total weight of leaves.

The recommended rate of ULTRABOOST combined with recommended rate of inorganic fertilizer (150-40-75 kg N P_2O_5 K_2O) is highly recommended for the production of highest yield of pechay (*Brassica rapa* L.).

Moreover, the application of ½ RRIF at the rate 75-20-36.5 kg N P_2O_5 K_2O combined with RR of ULTRABOOST can also be recommended for an economical option of pechay growers that can also result to higher yield.

[1] Project Leader, Bantug, Science City of Muñoz, Nueva Ecija, Philippines
[2]Research Assistant, Bantug, Science City of Muñoz, Nueva Ecija, Philippines

INTRODUCTION

Pechay belongs to the green leafy vegetable and has been used in Asian cooking for centuries. The leaves are delicious and crispy, and are excellent sources of Vitamin A, folic acid and essential elements such calcium and potassium, and fiber. Pechay is a cash crop and hence, for the farmers to get their returns at a shorter time, the need to employ fertilization should be looked into. The majority of agricultural production is done with the application of large amounts of chemicals, including fertilizers and pesticides. So, there is a need to apply nutrients in a more efficient manner where foliar application can be included and at the same time applied at the right time where such nutrient is required.

ULTRABOOST is a concentrated liquid fertilizer that will improve the interactions between your plants and soils. Biological interactions that improve plant health, increase plant nutrient utilization efficiency and improve the plants ability to get more photosynthetic output to reproduction. ULTRABOOST directly influences many critical plant functions that effect yield and quality like photosynthesis, respiration, fruit/grain fill and the plants natural ability to tolerate pathogens and stress.

OBJECTIVES OF THE STUDY:

The experiment generally aims to determine the effectiveness of ULTRABOOST as a foliar fertilizer for pechay (Black Behi var). Specifically, the study intends:

1. To evaluate different plant growth parameters (plant height, leaf area and number of leaves) of pechay as influenced by the different treatments for registration;
2. To determine the effectiveness of ULTRABOOST on the yield of pechay;
3. To compare the performance of ULTRABOOST with or without the combination of inorganic fertilizer.

Researcher: Dr. Constancia C. Dacumos
Accredited FPA Researcher
E-103/PNT/SPRT-65/P-240
Purok Villa Isidra, Barangay Bantug
Science City of Munoz, Nueva Ecija

MATERIALS AND METHODS

Time and Place of the Study

The study was conducted at Barangay Licaong, Science City of Munoz, Nueva Ecija. The duration of the experiment is about two (2) months including the report writing from June 2023 to August 2023. The experimentation included visits to the farm for evaluation and data gathering based on the growth and yield performance of the test crop.

Establishment of Fertilizer Recommendation

In order to determine the appropriate rate of inorganic fertilizer to apply, soil samples were taken prior to setting up of the field experiment and succeeding Soil Test Kit analysis was done. The recommended rate of inorganic fertilizer for pechay was based on soil analysis applied basally at transplanting time and at 15 DAP. Sources of inorganic fertilizers were 14-14-14 and Urea and the amount applied were based on fertilizer recommendation after soil analysis.

Experimental Treatments

The study had six (6) treatments together with the different descriptions of each treatment. The foliar fertilizer ULTRABOOST followed the recommended application schedule which included the rate of application, method and time of application.

Statistical Design

Six treatments were replicated three times and arranged in a Randomized Complete Block Design (RCBD).

Treatments

The following treatments based on FPA recommendations including the rates, frequency and methods of application were evaluated.

Treatments	Rate kg NPK /ha ml product/140.25ml water/10 sq. m	Time of Application	Method of Application
1.Control (no fertilizer)	-	-	-
2.Recommended Rate of Inorganic Fertilizer (RRIF)	Based on soil analysis	Basal,15DAP	Broadcast
3. ½ RRIF	Based on soil analysis	Basal,15DAP	Broadcast
4. ½ RRIF + Recommended Rate of ULTRABOOST	Based on soil analysis 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	Broadcast Soil application Foliar spray
5.Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	Before planting 7 days after emergence	Soil application Foliar spray
6. RRIF + Recommended Rate of ULTRABOOST	Based on soil analysis 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	Broadcast Soil application Foliar spray

Size

The approximate size of the experimental area is 1881 square meters. The size of each plot was 10 sq. m (2m x 5 m) as stated on the FPA manual for required plot size of leafy vegetables under study. Each block contained 6 experimental units replicated 3 times giving a total of 18 experimental units for the whole experiment. The experimental units were separated from one another by 9m spacing, while the blocks were also separated by 9 m spacing.

Cultural Practice

The nurseries for the test crop, clearing and tillage operations were established and done immediately after granting the Experimental Use Permit (EUP). Direct planting of seeds was immediately followed. As soon as the seedlings reach two weeks old, thinning was done leaving a distance of 50 cm between plants and rows. Weeding and irrigation were carried out as need arises.

Data Gathered on Growth Parameters

Microplot

This consisted of ten (10) representative sample plants randomly selected in the middle of each experimental unit where growth parameters such as plant height, leaf area and number of leaves were determined. The measurements were taken 25 days after planting (DAP).

Leaf length and width (cm)

Leaf length and width were determined by measuring the length and width of all the leaves on the 10 sample plants using a simple ruler and the average leaf length and width of the 10 plants were recorded.

Number of Leaves

Number of leaves was measured by counting the leaves on each plant and the mean of the 10 sample plants represented the number of leaves for each respective experimental unit.

Data Gathered on Yield Parameters

Yield

Yield (fresh weight basis) was taken at 30 DAP (at harvest) by cutting and weighing the entire above ground vegetation of the randomly selected 10 plants in each experimental unit. The mean weight of each ten plants was recorded as the yield of each experimental unit.

Data Analysis and Interpretation

Data gathered were analyzed and subjected to Analysis of Variance (ANOVA). Treatment means were compared using Tukey's Honest Significant Difference at 5% level of significance.

Experimental Field Layout

9m 9m

5m T4R1 2m	T1R2	T4R3
9m		
T3R1	T6R2	T2R3
9m		
T1R1	T5R2	T1R3
9m		
T2R1	T4R2	T6R3
9m		
T5R1	T3R2	T3R2
9m		
T6R1	T2R2	T5R2

Figure 1. Field Layout for the Efficacy Trial for Registration of ULTRABOOST as a Foliar fertilizer for Pechay (*Brassica rapa* L.)

RESULTS AND DISCUSSION

Plant Height (cm) at 25 days after planting (DAP)

Results showed that application of recommended rate (RR) of ULTRABOOST (Treatment 6) as basal application before planting at the rate of 2.3ml by soil application and 1.75ml 7 days after emergence in every 140.25 ml of water per 10sq.m plot in combination with the recommended rate of inorganic fertilizer (RRIF) at the rate of 150-40-75 kg N P_2O_5 K_2O produced the tallest plants (15.79cm) at 25 days after planting (DAP). This was highly significant among other treatments and better than RRIF alone that produced plant height of only 11.13cm and better than the untreated control (Treatment 1) which produced the shortest plant height of 9.24cm. It was found out that the activity of applying of ULTRABOOST when supplemented by the addition of the recommended rate of inorganic fertilizer, the height of plants became significantly taller than the other treatments (summary table 1).

Summary Table 1. Average plant height (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP)

Treatments	Rate kg NPK /ha ml product/140.25ml water/10 sq. m	Time of Application	Plant Height (cm) at 25 DAP
T1 - Control (no fertilizer)	-	-	9.24^{d}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	Basal,15DAP	11.13^{c}
T3 - ½ RRIF	75-20-37.5	Basal,15DAP	10.69^{cd}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	13.14^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	Before planting 7 days after emergence	12.27^{bc}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	15.79^{a}

Means that do not share a letter are significantly different using Tukey's HSD at P=0.05 confidence level of significance

Leaf length (cm), Width (cm), and Leaf Area (cm) at 25 days after planting (DAP)

It was noted in summary table 2 that treatment with combination of RR of ULTRABOOST and RRIF (treatment 6) produced the longest length and widest width having 9.10cm and 8.14cm, respectively which were highly significant among the other treatments especially the application of inorganic fertilizer alone. It was noted that combination mentioned above was way better than the untreated plants and application of other treatments. Untreated sample plants significantly obtained the shortest (5.02cm) and narrowest (4.17cm) leaves. Moreover, in terms of leaf area, it can be seen in summary table 2 that treatment with RRIF + RR of ULTRABOOST acquired the highest leaf area with 74.16cm.

Summary Table 2. Average leaf length (cm), width (cm), and leaf area (cm^2) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP)

Treatments	Rate kg NPK /ha ml product/140.25ml water/10 sq. m	Time of Application	Leaf Length (cm)	Leaf Width (cm)	Leaf Area (cm^2)
T1 - Control (no fertilizer)	-	-	5.02^{d}	4.17^{d}	20.94^{d}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	Basal,15DAP	6.56^{c}	5.64^{bc}	37.07^{bc}
T3 - ½ RRIF	75-20-37.5	Basal,15DAP	5.87^{c}	5.01^{c}	29.43^{cd}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	7.53^{b}	6.35^{b}	47.93^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	Before planting 7 days after emergence	6.48^{c}	5.55^{bc}	35.94^{c}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	9.10^{a}	8.14^{a}	74.16^{a}

Means that do not share a letter are significantly different using Tukey's HSD at P=0.05 confidence level of significance

Number of leaves at 25 days after planting (DAP)

Presented in summary table 3 is the average number of leaves at 25 days after planting (DAP). It can be noted that treatments with a combination of RR of ULTRABOOST and RRIF (treatment 6) produced the highest number of leaves having 6 number of leaves. Treatment of ½ RRIF + RR of ULTRABOOST obtained the second number of leaves (5) while untreated sample (treatment 1) has the lowest number of leaves having only 3 numbers of leaves. Increased in number of leaves was brought about by the application of RR of ULTRABOOST and recommended rate of Inorganic fertilizer.

Summary Table 3. Average number of leaves of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP)

Treatments	Rate kg NPK /ha ml product/140.25ml water/10 sq. m	Time of Application	Average number of leaves
T1 - Control (no fertilizer)	-	-	3.37[d]
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	Basal,15DAP	4.03[c]
T3 - ½ RRIF	75-20-37.5	Basal,15DAP	3.97[c]
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	5.10[b]
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	Before planting 7 days after emergence	4.17[c]
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	5.87[a]

Means that do not share a letter are significantly different using Tukey's HSD at P=0.05 confidence level of significance

Weight (g) of each pechay plant at harvest

Summary table 4 shows the average weight (g) of each pechay plant at 30 days after planting (at harvest). Results showed that the combination of RRIF and recommended rate of ULTRABOOST (Treatment 6) produced the heaviest weight (g) of plant having 97.53g while ½ RRIF with RR of ULTRABOOST (Treatment 4) obtained the second heaviest weight with 85.53g while untreated control (Treatment 1) has the lightest weight having 28.43g.

It can be noted further that the application of RRIF combined with RR of ULTRABOOST produced a significant increase of 20.48g over the application of inorganic fertilizer alone.

Summary Table 4. Average weight of (g) each pechay plant at 30 days after planting (at harvest) as affected by different treatments

Treatments	Rate kg NPK /ha ml product/ 140.25ml water/ 10 sq. m	Time of Application	Average weight (g) per pechay plant
T1 - Control (no fertilizer)	-	-	28.43[e]
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	Basal,15DAP	77.05[c]
T3 - ½ RRIF	75-20-37.5	Basal,15DAP	64.60[d]
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	85.53[b]
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	Before planting 7 days after emergence	67.14[d]
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	97.53[a]

Means that do not share a letter are significantly different using Tukey's HSD at P=0.05 confidence level of significance

Computed yield of pechay plant in kilogram per hectare (kg/ha) and tons per hectare (tons/ha)

Summary table 5 showed results in this parameter that was highly significant as affected by the different treatments evaluated.

Application of recommended rate of inorganic fertilizer (RRIF) in combination of recommended rate of ULTRABOOST produced significantly the highest yield of 24383.33 kg/ha equivalent to 24.38 tons/ha followed by the yield obtained by the application of RR of ULTRABOOST in supplementation of ½ RRIF with 21381.67 kg/ha or 21.38 tons/ha.

Based on the computed value, results of the study showed that compared to the application of recommended rate of inorganic fertilizer alone, the combination of the RR of ULTRABOOST + RRIF showed an increase in yield of 5120.83 kg/ha or 5.12 tons/ha. Moreover, the percent increase in yield using RR of ULTRABOOST + ½ RRIF is 2119.17 kg/ha or 2.12 tons/ha over that of inorganic fertilizer application alone.

Among other treatments, the untreated plants produced the lowest yield with an average of 7108.33 kg or 7.11 tons/ha.

Summary Table 5. Total yield of pechay plant in kilogram per hectare (kg/ha) and tons per hectare (tons/ha) at harvest as affected by different treatments

Treatments	Rate kg NPK /ha ml product/ 140.25ml water/ 10 sq. m	Time of Application	Total yield of pechay (kg/ha)	Total yield of pechay (tons/ha)
T1 - Control (no fertilizer)	-	-	7108.33^{e}	7.11^{e}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	Basal,15DAP	19262.50^{c}	19.26^{c}
T3 - ½ RRIF	75-20-37.5	Basal,15DAP	16150.00^{d}	16.15^{d}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	21381.67^{b}	21.38^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	Before planting 7 days after emergence	16785.83^{d}	16.79^{d}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	Basal,15DAP Before planting 7 days after emergence	24383.33^{a}	24.38^{a}

Means that do not share a letter are significantly different using Tukey's HSD at P=0.05 confidence level of significance

SUMMARY AND CONCLUSION

The efficacy of ULTRABOOST as foliar blend supplement in promoting higher and faster growth rates and yield of Pechay (*Brassica rapa* L.) was conducted from June 2023 to August 2023 at Barangay Licaong, Science City of Muñoz, Nueva Ecija.

There were six (6) treatments evaluated. The experiment was laid out using Randomized Complete Block Design (RCBD) with three replications. Analysis of variance (ANOVA) revealed significant variations on traits such as plant height (cm), leaf length (cm) and width (cm), leaf area (cm^2), number of leaves, and weight (g) of pechay (*Brassica rapa* L.).

The following were the significant highlights of the efficacy trial: Application of ULTRABOOST as soil application (2.3ml) and foliar spray at 7 days after emergence (1.75ml) in every 140.25 ml of water per 10sq.m plot in combination with the recommended rate of inorganic fertilizer (RRIF) at the rate of 150-40-75 kg N P_2O_5 K_2O produced at 25 days after planting (DAP) the tallest plant, longest and widest leaves, highest number of leaves, and heaviest weight of plant at harvest. The total weight of leaves was comparable to the application of ½ RRIF (75-20-37.5 kg $N_2P_2O_5K_2O$) and RR of ULTRABOOST. Both of these treatments were comparable in producing highest yield of leaves, therefore, they are highly recommended.

Findings revealed that the recommended application for obtaining higher yield of pechay (*Brassica rapa* L.) was the application of ULTRABOOST at the rate of 2.3ml applied before planting by soil application and 7 days after emergence (1.75ml) by foliar spray in supplementation of RR inorganic fertilizer.

Furthermore, the application of RR ULTRABOOST alone was comparable with the application of ½ recommended rate of inorganic fertilizer alone in obtaining the total weight in kg and tons of pechay plants per hectare. .

APPENDIX TABLES

Appendix Table 1. Average plant height (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Treatments	**Rate**	REPLICATION	TOTAL	MEAN

	kg NPK /ha ml /10 sq. m	I	II	II		
T1 - Control (no fertilizer)	-	9.11	9.39	9.23	27.73	9.24^{d}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	11.36	11.21	10.81	33.38	11.13^{c}
T3 - ½ RRIF	75-20-37.5	10.81	10.53	10.74	32.08	10.69^{cd}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	12.24	14.32	12.85	39.41	13.14^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	11.46	12.31	13.03	36.80	12.27^{bc}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	15.07	16.79	15.51	47.37	15.79^{a}

Appendix Table 1. Analysis of variance on average plant height (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	1.6894	0.8447	2.30	4.10	7.56
Treatment	5	77.3566	15.4713	42.12**	3.33	5.64
Error	10	3.6728	0.3673			
Total	17	82.7188				

**= highly significant
cv= 5.03%

Appendix Table 2.1a. Average leaf length (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Treatments	Rate	REPLICATION	TOTAL	MEAN

	kg NPK/ha ml/10 sq.m	I	II	II		
T1 - Control (no fertilizer)	-	5.15	5.01	4.90	15.06	5.02[d]
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	6.98	6.25	6.46	19.69	6.56[c]
T3 - ½ RRIF	75-20-37.5	5.88	5.79	5.95	17.62	5.87[c]
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	7.33	8.00	7.27	22.60	7.53[b]
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	6.42	6.78	6.23	19.43	6.48[c]
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	9.10	9.52	8.68	27.30	9.10[a]

Appendix Table 2.1b. Analysis of variance on average leaf length (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	0.3138	0.1569	1.84	4.10	7.56
Treatment	5	29.9880	5.9976	70.38**	3.33	5.64
Error	10	0.8522	0.0852			
Total	17	31.1540				

**= highly significant
cv= 4.32%

Appendix Table 2.2a. Average leaf width (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Treatments	Rate	REPLICATION	TOTAL	MEAN

	kg NPK/ha ml/10 sq.m	I	II	II		
T1 - Control (no fertilizer)	-	4.32	3.95	4.24	12.51	4.17^{d}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	5.79	5.41	5.73	16.93	5.64^{bc}
T3 - ½ RRIF	75-20-37.5	5.15	4.96	4.92	15.03	5.01^{c}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	6.00	6.87	6.17	19.04	6.35^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	5.68	5.46	5.51	16.65	5.55^{bc}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	8.13	8.53	7.76	24.42	8.14^{a}

Appendix Table 2.2b. Analysis of variance on average leaf width (cm) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	0.0688	0.0344	0.39	4.10	7.56
Treatment	5	27.4171	5.4834	62.75**	3.33	5.64
Error	10	0.8739	0.0874			
Total	17	28.3598				

**= highly significant
cv= 5.09%

Appendix Table 2.3a. Average leaf area (cm^2) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Treatments	Rate	REPLICATION	TOTAL	MEAN

	kg NPK/ha ml/10 sq.m	I	II	II		
T1 - Control (no fertilizer)	-	22.25	19.79	20.78	62.81	20.94^{d}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	40.39	33.80	37.02	111.21	37.07^{bc}
T3 - ½ RRIF	75-20-37.5	30.29	28.72	29.27	88.29	29.43^{cd}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	43.95	55.00	44.85	143.80	47.93^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	36.48	37.04	34.31	107.83	35.94^{c}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	73.90	81.17	67.40	222.48	74.16^{a}

Appendix Table 2.3b. Analysis of variance on average leaf area (cm^2) of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	40.7336	20.3668	1.27	4.10	7.56
Treatment	5	5174.9910	1034.9982	64.79**	3.33	5.64
Error	10	159.7510	15.9751			
Total	17	5375.4756				

**= highly significant
cv= 9.77%

Appendix Table 3. Average number of leaves of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Treatments	Rate	REPLICATION	TOTAL	MEAN

	kg NPK/ha ml/10 sq.m	I	II	II		
T1 - Control (no fertilizer)	-	3.20	3.54	3.36	10.10	3.37[d]
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	4.00	4.00	4.10	12.10	4.03[c]
T3 - ½ RRIF	75-20-37.5	3.92	4.20	3.79	11.91	3.97[c]
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	5.00	5.20	5.10	15.30	5.10[b]
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	3.80	4.30	4.40	12.50	4.17[c]
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	5.50	6.20	5.90	17.60	5.87[a]

Appendix Table 3. Analysis of variance on average number of leaves of ten (10) randomly selected sample plants in the middle of a plot at 25 days after planting (DAP) as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	0.3454	0.1727	6.16	4.10	7.56
Treatment	5	12.2427	2.4485	87.37**	3.33	5.64
Error	10	0.2803	0.0280			
Total	17	12.8684				

**= highly significant
cv= 3.79%

Appendix Table 4. Average weight (g) of each pechay plant at 30 days after planting (at harvest) as affected by different treatments

Treatments	Rate kg NPK/ha ml/10 sq.m	REPLICATION			TOTAL	MEAN
		I	II	II		
T1 - Control (no fertilizer)	-	29.10	26.70	29.50	85.30	28.43[e]
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	76.50	75.60	79.05	231.15	77.05[c]
T3 - ½ RRIF	75-20-37.5	65.10	64.80	63.90	193.80	64.60[d]
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	85.00	82.59	88.99	256.58	85.53[b]
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	65.71	68.67	67.05	201.43	67.14[d]
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	95.30	98.20	99.10	292.60	97.53[a]

Appendix Table 4. Analysis of variance on average weight (g) of each pechay plant at 30 days after planting (at harvest) as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	13.3365	6.6683	2.11	4.10	7.56
Treatment	5	8441.8768	1688.3754	534.10**	3.33	5.64
Error	10	31.6117	3.1612			
Total	17	8486.8251				

**= highly significant
cv= 2.54%

Appendix Table 5.1a. Total yield of pechay plants in kilogram (kg/ha) at harvest as affected by different treatments

Treatments	Rate kg NPK/ha ml/10 sq.m	REPLICATION			TOTAL	MEAN
		I	II	II		
T1 - Control (no fertilizer)	-	7275	6675	7375	21325	7108.33^{e}
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	19125	18900	19762.5	57787.5	19262.50^{c}
T3 - ½ RRIF	75-20-37.5	16275	16200	15975	48450	16150.00^{d}
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	21250	20647.5	22247.5	64145	21381.67^{b}
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	16427.5	17167.5	16762.5	50357.5	16785.83^{d}
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	23825	24550	24775	73150	24383.33^{a}

Appendix Table 5.1b. Analysis of variance on total yield of pechay plants in kilogram (kg/ha) at harvest as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	833534.0278	416767.0139	2.11	4.10	7.56
Treatment	5	527617302.7778	105523460.5556	534.10**	3.33	5.64
Error	10	1975732.6389	197573.2639			
Total	17	530426569.4444				

**= highly significant
cv= 2.54%

Appendix Table 5.2a. Total yield of pechay plants in tons per hectare at harvest as affected by different treatments

Treatments	Rate kg NPK/ha ml/10 sq.m	REPLICATION			TOTAL	MEAN
		I	II	II		
T1 - Control (no fertilizer)	-	7.275	6.675	7.375	21.325	7.11[e]
T2 - Recommended Rate of Inorganic Fertilizer (RRIF)	150-40-75	19.125	18.9	19.7625	57.7875	19.26[c]
T3 - ½ RRIF	75-20-37.5	16.275	16.2	15.975	48.45	16.15[d]
T4 - ½ RRIF + Recommended Rate of ULTRABOOST	75-20-37.5 2.3 ml 1.75 ml	21.25	20.6475	22.2475	64.145	21.38[b]
T5 - Recommended Rate of ULTRABOOST	2.3 ml 1.75 ml	16.4275	17.1675	16.7625	50.3575	16.79[d]
T6 - RRIF + Recommended Rate of ULTRABOOST	150-40-75 2.3 ml 1.75 ml	23.825	24.55	24.775	73.15	24.38[a]

Appendix Table 5.2b. Analysis of variance on total yield of pechay plants in tons per hectare at harvest as affected by different treatments

Source	DF	Sum of Square	Mean of Square	F value	F-tab	
					F.05	F .01
Replication	2	0.8335	0.4168	2.11	4.10	7.56
Treatment	5	527.6173	105.5235	534.10**	3.33	5.64
Error	10	1.9757	0.1976			
Total	17	530.4266				

**= highly significant
cv= 2.54%

APPENDIX FIGURES

Appendix Figure 1. Land preparation

Appendix Figure 2. Soil application

Appendix Figure 3. Planting

Appendix Figure 4. Treatment application (foliar spraying) and product used

Appendix Figure 5. General view of the experimental area

10 days after planting (10 DAP)

20 days after planting (20 DAP)

Before harvest

Appendix Figure 6. Representative treatments 10 days after planting (10 DAP)

T1 - Control (no fertilizer)

T2 - RRIF alone

T3 - ½ RRIF

T4 - ½ RRIF + RR of ULTRABOOST

T5 - RR of ULTRABOOST alone

T6 - RRIF + RR of ULTRABOOST

Appendix Figure 7. Representative treatments 20 days after planting (20 DAP)

T1 - Control (no fertilizer)

T2 - RRIF alone

T3 - ½ RRIF

T4 - ½ RRIF + RR of ULTRABOOST

T5 - RR of ULTRABOOST alone

T6 - RRIF + RR of ULTRABOOST

Appendix Figure 8. Representative treatments 25 days after planting (25 DAP)

T1 - Control (no fertilizer)

T2 - RRIF alone

T3 - ½ RRIF

T4 - ½ RRIF + RR of ULTRABOOST

T5 - RR of ULTRABOOST alone

T6 - RRIF + RR of ULTRABOOST

Appendix Figure 9. Representative sample plants

T1 - Control (no fertilizer)

T2 - RRIF alone

T3 - ½ RRIF

T4 - ½ RRIF + RR of ULTRABOOST

T5 - RR of ULTRABOOST alone ULTRABOOST

T6 - RRIF + RR of

Appendix Figure 10. Harvesting

Appendix Figure 11. Data gathering

Appendix Figure 12. Representative of 10 sample plants

T1 - Control (no fertilizer)

T2 - RRIF alone

T3 - ½ RRIF

T4 - ½ RRIF + RR of ULTRABOOST

T5 - RR of ULTRABOOST alone

T6 - RRIF + RR of ULTRABOOST

Appendix Figure 13. Representative weight per sample plant

T1 - Control (no fertilizer)

T2 - RRIF alone

T3 - ½ RRIF

T4 - ½ RRIF + RR of ULTRABOOST

T5 - RR of ULTRABOOST alone

T6 - RRIF + RR of ULTRABOOST

Appendix Figure 14. Other field activities