HYFER PLUS BLOOM BOOSTER EFFICACY TEST

ON MANGO

INTRODUCTION

Mango (*mangiferia indica* L.) is one of the most popular tropical fruits in the world. In our country, mango is not considered national fruit for nothing. Aside from its fine taste and nutritional value, it has a significant contribute to the country's export industry. Philippine mango has established an international niche markets and ranks as third most important fruit crop of the country nest to pineapple and banana on value and volume.

Mangoes in general do not require intensive fertilization because they can survive in poor and infertile soils. However, proper fertilization and maintenance are necessary to stimulate early growth and rapid development of young trees.

To achieve high yield in mango, increase in fertilizer input is needed to sustain its mineral nutrition. Generally, the fertilizers are applied to the soil and supplied nutrients are subjected to great losses through leaching; denitrification; volatilization and other processes. Thus, alternative method of supplying nutrients to some crops has gained popularity in recent years. This method is effective since the nutrients can penetrate rapidly and readily absorbed through plant leaves. Also, foliar application of fertilizer has been used principally for quick recovery from nutrient deficiency and more effective compare to soil applications of fertilizers.

AGROTIGER PHILIPPINES CORPORATION has the sincere intention to acquire the full production registration permit of the HYFER PLUS BLOOM BOOSTER, thus this test is result being submitted.

OBJECTIVES

To generate parametric data on the yield response of mango to HPBB application that would suffice the requirement of Fertilizer and Pesticide Authority in granting Full Product Registration Permit.

EXPERIMENTAL SITE

The experimental area is located at in Brgy. Dasal Sibunag, Guimaras. Dasal is considered as inland barangay which generated and empties its water resource from the big Sibunag river. Its altitude ranges from 0 to 100 meter, slope ranging from 8% to 18% terrain is actually undulating to rolling.

The soil was derived from weathering of volcanic and other sedimentary rocks. Deptric Nitosols (as indicated in Sibunag Mapping [FAO Classification System]) are observed to be well drained and have about 50% gravel in the surface and rooting depth extends to 40 cms. below the ground. Physical and chemical analysis of the soil collected showed the unit is slightly acid in reaction, low amount of N and P and sufficient amount of K.

Sibunag climate is type I classification. It has two pronounced seasons, dry from November to May and wet from June to October. The months of March to May and July to September are monotonously high – the hottest mean temperature is 28.3°C and the annual temperature is 27°C.

The average monthly rainfall is 197.03 cm and mean monthly relative is 84.51 and average monthly number of rainy days is 11.4

The experimental site has 100 mangoes (20-25 years old grown and fertilized with inorganic fertilizers for the last five years [5kgs T-14 per tree]).



Figure 1. The Experimental Site

VARIETY

Super Galila carabao mango variety was used as test crop in the study.

MATERIALS AND METHODS

1. Product Description

HPBB (4-4-24) is one of the products to be marketed locally and abroad by AGROTIGER PHILIPPINES CORPORATION. It is a foliar fertilizer recommended for vegetables, rice, ornaments, and other high value crops. It contains trace amounts of boron, copper, calcium, iron, manganese, molybdenum, sodium, sulphur, and zinc. It also contains substantial amount of humic acid, vitamins and amino acids. HPBB has almost neutral pH (6.2-6.6) and compatible with commonly used agricultural pesticides without hampering the efficacy of their active ingredients.

It contains the following nutrients:

Nitrogen (N)	-	4%

Phosphorus (P_2O_5) - 4%

- Potassium 24%
- 2. Experimental Requirements

Site	:	Brgy. Sibunag, Jordan, Guimaras
Soil Analysis	:	Before Experiment
Treatment	:	Six (6)
Crop	:	Three (3)
Variety	:	Carabao
Design	:	RCBD

3. Treatments

As prescribed by FPA and special reference to the on site 15-20 year old mango trees – 100 trees in a hectare already growing in the area, the following treatments was adopted.

T1 – Control (no fertilizer)

T2 – 30-0-0 kg/ha of NPK

T3 – 15-0-0 kg/ha of NPK

T4 – 15-0-0 + 500ml HYFER PLUS BB TO DILUTED IN 150L of water

T5 – 500ml HPBB to be diluted in 150L of water

T6 - 30-0-0 + 500ml HPBB to be diluted in 150L of water

*HYFER PLUS BB was diluted in 150L of water and sprayed 21 DAFI, 35 DAFI, and 60 DAFI.



* Inorganic fertilizers was applied in split – August 15, 2019 to December 27, 2019.



4. Procedure

An area of approximately five-thousand (5,000) square meters in Guimaras Island was used in the study. The soil was analyzed prior to setting up the experiment. Recommended rate for inorganic fertilizer was followed. There was eighteen (18) mango trees aged 15-20 years, uniform size and flowering intensity that was the subject of the study. Soil fertilization began after pruning to encourage the growth of vegetative shoots prior to flower induction (F.I.). Only treatment trees received recommended and necessary rate of inorganic fertilizer at the rate of five (5) kilos per tree. Application of HYFER PLUS BLOOM BOOSTER (HPBB) was timed at the pre-bloom, fruit set and fruit development using high power sprayer and spray volume of one-hundred fifty (150) liters per tree.

TIME OF STUDY

The study bean August 13, 2019 and ended January 15, 2020

FLOWER INDUCTION

500 ml of Hyfer Plus Bloom Booster was mixed with 200 liters of water and was sprayed at a volume of 150 liter per mango tree.

FERTILIZATION

Granular fertilizer was applied around the tree 2-meter radius from the trunk and 25 cm deep or following the canopy drip line.

Treatments and Fertilization Scheme

	Product	Rate	Timing of Application
T1 - no fertilizer			
T2 20.0.0 kg/ha of NDV	urea	326gms/tree	-onset of rainy season
12 - 30-0-0 kg/lia 01 NFK	urea	326gms/tree	-start of dry season
T2 15 0.0 kg/ha of NDV	urea	163 gms/tree	-onset of rainy season
13 - 13-0-0 kg/lia 01 NFK	urea	163 gms/tree	-start of dry season
T4 - 15-0-0 kg/ha of NPK + 500ml Hyfer Plus BB	urea urea HPBB	163 gms/tree 163 gms/tree 500ml	-onset of rainy season -start of dry season -during pre-bloom fruit set and fruit development stage
T5 - 500ml HPBB	HPBB	500ml	-during pre-bloom fruit set and fruit development stage
T6 - 30-0-0 kg/ha of NPK + 500ml HPBB	urea urea HPBB	326 gms/tree 326 gms/tree 500ml	-onset of rainy season -start of dry season -during pre-bloom fruit set and fruit development stage

Urea - (46-0-0) will be applied in 6 to 8 holes, 2 to 3 meters away from the base of the tree or depending to the extent of the canopy.

CULTIVATION AND WEEDING

The area was cleaned and weed were cut manually in regular basis to maintain sanitation.

PEST AND DISEASE CONTROL

Pest and diseases was controlled by spraying pesticides and fungicides before the flower induction process. Pesticide spraying was done eight times and fungicide use was five times to free the trees from infection. Chemicals used were seven and Amistar

WATER MANAGEMENT

Irrigation facilities were provided in the area to ensure that water will be available during the dry season.

HARVEST AND DATA GATHERING

Fruits will be harvested one hundred twenty (120) days to one hundred thirty (130) days after flowers induction.

The following are the data gathered:

1. No. of fruits/panicle at thumb-size (45-60 DAF)

This was done by counting the number of thumb-size developed fruits from the 25 tagged infloresence.

2. No. of fruits/panicle at Egg-size (65 DAFI)

This was obtained by counting the egg-size developed fruit from the 25 tagged inflorescence

3. No. of fruits/panicle at Harvest

This was determined by counting the retained fruit from the tagged inflorescence at harvest

4. Average weight of Single fruit (kg)

This was qualified fruits divided by the number of fruits from the tagged inflorescence.

5. Average marketable Fruit/Tree (kg)

This was obtained by weighing all the fruits developed from the 25 tagged inflorescence per tree.

6. Average Unmarketable Fruits/Tree (kg)

This was done by weighing all the diseased, deformed and unhealthy fruits from the tagged inflorescence per tree.

STATISTIAL ANALYSIS

Yield data that was generated was analyzed using the Analysis of Variance (ANOVA) for Randomized Complete Block Design (RCBD). Least Significant Difference Test (LSDT) was used to test the level of significance among treatment means.

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RESULTS AND DISCUSSION

Table I. Summary of Means of `	Yield Components a	s affected by the	e application H	IYFER
PLUS BB.				

Treatments	Number of Fruits/Panicle at Thumb Stage (45- 60 DAFI)	Number of Fruits/Panicle at Egg-size (65 DAFI)	Number of Fruits/Panicla at Harvest
1	6.00 c	2.77 d	1.00 d
2	9.40 b	4.77 c	2.17 bc
3	7.33 c	3.50 d	1.33 d
4	12.10 a	6.93 ab	2.67 b
5	10.60 b	6.00 b	2.00 c
6	13.25 a	7.60 a	4.00 a
Pr	**	**	**
CV	8.38%	11.90%	14.20%

No. Fruits/Panicle at Thumb-stage 45-60(DAFI)

The use of 500 ml Hyfer plus Bloom Booster to supplement the 30-0-0 kg per hectare of NPK registered the highest thum-bsize fruits of 13.25, significantly higher by 2.85 fruits against the unsprayed one plus the soil application of full inorganic fertilizer based on soil analysis (T2). T4 plants obtained 12.10 fruitlets, significantly better by 4.77 fruitlets over T3 mangoes which produced 7.33 fruitlets. Sprayed mangoes using 500 ml of HYFER plus Bloom Booster (T5) showed 10.60 thumb-size fruits, remarkably better by 4.60 fruitlets against the control plants.



Figure 1. Number of Fruits/Panicle at Thumb Stage (45-60 DAFI)

No. of Egg-size Fruits/Panicle (65 DAFI)

A comparison of egg-size fruits means showed that the foliar spraying of HYFER PLUS BB in addition to soil application of 30-0-0 kilograms of NPK (T6) showed a significantly better fruitlets over unsprayed plants treated with the same amount of inorganic fertilizers (T2). The same performance was exhibited by plants sprayed with 500 ml HYFER PLUS BB and 50 percent reduction in the inorganic fertilizer usage (T4) over unsprayed mangoes (T3) with the former showing remarkably better 3.43 fruits over the latter.

The lowest member of egg-size per panicle was 2.77 recorded from the control planets



Figure 2. Number of Fruits/Panicle at Egg-size (65 DAFI)

No. of Fruits/Panicle at Harvest (pcs)

The highest member of fruits per panicle at harvest was 4.00 taken from T6 trees, significantly better by 1.83 fruits against unsprayed (T2) trees which registered 2.17 fruits per panicle. The use of 500 ml Hyfer Plus BB alone (T5) is significantly better by 1.00 fruits per panicle over control plants and higher by 0.67 fruits over T3 mangoes.



Figure 3. Number of Fruits/Panicla at Harvest

Treatments	Average Weight of Single Fruit (kg)	Average Marketable Fruit/Tree	Average Unmarketable Fruit/Tree
1	0.19 c	3.70 e	1.33 c
2	0.27 a	6.40 c	2.23 b
3	0.22 bc	4.68 d	1.63 c
4	0.25 ab	7.53 b	2.42 b
5	0.21 bc	6.67 c	2.40 b
6	0.28 a	10.02 a	2.77 a
Pr	**	**	**
CV	8.64%	7.18%	8.28%

Table II. Summary of the Yield Means applied by the application of HYFER PLUS BB

AVERAGE WEIGHT OF SINGLE FRUIT

A comparable weight performance of 0.27 and 0.28 kilograms per fruit was exhibited by T2 and T6 mangoes. Trees sprayed with 500 ml HYFER UREA PLUS BB plus ½ RRIF (T4) recorded an average of 0.25 kilograms per fruit, significantly heavier by 30 grams over those applied with inorganic fertilizer (½ RRIF) alone. The use of 500 ml Hyfer Plus BB alone as foliar spray recorded, an average single fruit weight of 0.21 kilograms, significantly better by 20 grams over the control plants.



Figue 4. Average Weight of Single Fruit (kg)

AVERAGE MARKETABLE FRUIT/TREE (KG)

Among treatment means, average marketable fruits weight per tree was 10.02 kilograms weight from mangoes applied with inorganic fertilizer (RRIF) and sprayed with 500 ml Hyfer Plus BB (T6), significantly heavier by 3.62 kilograms compared to the harvested fruits from mangoes fertilized with 30-0-0 per hectare of NPK (T2). Treated T2 plants registered average of 6.40 kilograms fruits per basket. Harvested fruits from mangoes sprayed by 500 ml of Hyfer Plus BB (T5) revealed 6.67 kilograms, significantly heavier by 2.47 kilograms compared to fruits from control plants. Control plants registered an average fruit weight of 3.70 kilograms per tree.



Figure 5. Average Marketable Fruit/Tree

AVERAGE UNMARKETABLE FRUIT/TREE

Most of the rejected deformed and diseased fruits were obtained from mangoes fertilized with 30-0-0 kilograms per hectare of NPK supplements by 500 ml of HYFER PLUS Bloom booster (T6) which weighed 2.77 kilograms per tree. Mangoes sprayed with 500 ml of HYFER PLUS Bloom Booster (T5) alone exhibited 2.40 kilograms unmarketable fruits comparable with fruits weighed from T4 and T2 trees. Control trees showed 1.33 kilograms unmarketable fruit per tree.



Figure 6. Average Unmarketable Fruit/Tree

Conclusion and Recommendations

The yield components of carabao mango were significantly influenced by the varying degree of fertilization. The use of 500 ml Hyfer Plus Bloom Booster mixed-in 150 liters of water as foliar spray in addition to 30-0-0 kilograms NPK per hectare, exhibited a remarkable increase in number of fruits per panicle produced 45-60 DAFI, 65 DAFI and at harvest. The same noteworthy trend was shown in the average single fruit weight, average marketable fruit and average unmarketable fruit per tree.

Based on the findings therefore, the use of 500 ml Hyfer Plus Bloom booster mixed in 150 liters of water as foliar spray, the supplement of the same to inorganic fertilizer soil application on mangoes is highly recommended.

Appendix Table 1. Number of Fruits/Panicle at Thumb Stage (45-60 DAFI)

Treatments		Replication			Mean
	Ι	II	III	_	
1	6.50	5.30	6.20	18.00	6.00
2	9.30	10.60	8.30	28.20	9.40
3	8.00	7.30	6.70	22.00	7.33
4	12.50	11.50	12.30	36.30	12.10
5	10.20	12.00	9.60	31.80	10.60
6	13.50	13.00	13.25	39.75	13.25
Total	60.00	59.70	56.35		
Grand Total				176.05	
Grand Mean					9.78

Appendix Table 1a. ANOVA on number of Fruits/Panicle at Thumb Stage (45-60 DAFI)

Sources of	Degrees	Sum of	Mean	F value	Pr>F
Variation	of	Squares	Squares		
	Freedom				
Rep	2	1.3686111	0.6843056	1.02	0.396 ns
Trt	5	115.5440278	23.1088056	34.37	<.0001 **
Error	10	6.7230556	0.6723056		
Total	17	123.6356944			

CV= 8.38%

Appendix Table 2. Number of Fruits/Panicle at Egg-size (65 DAFI)

Treatments		Replication			Mean
	Ι	II	III	-	
1	3.11	2.50	2.70	8.31	2.77
2	5.20	5.60	3.50	14.30	4.77
3	4.00	3.50	3.00	10.50	3.50
4	7.50	6.30	7.00	20.80	6.93
5	5.50	6.30	6.20	18.00	6.00
6	8.50	7.30	7.00	22.80	7.60
Total	33.81	31.50	29.40		
Grand Total				94.71	
Grand Mean					5.26

Appendix Table 2a. ANOVA on number of Fruits/Panicle at Egg-size (65 DAFI)

Sources of	Degrees	Sum of	Mean	F value	Pr>F
Variation	of	Squares	Squares		
	Freedom				
Rep	2	1.6219	0.81095	2.07	0.1774 ns
Trt	5	55.09291667	11.01858333	28.07	<.0001 **
Error	10	3.92483333	0.39248333		
Total	17	60.63965			

CV=11.90%

Appendix Table 3. Number of Fruits/Panicla at Harvest

Treatments		Replication			Mean
	Ι	II	III		
1	1.00	1.00	1.00	3.00	1.00
2	2.00	2.00	2.50	6.50	2.17
3	1.00	1.00	2.00	4.00	1.33
4	3.00	2.00	3.00	8.00	2.67
5	2.00	2.00	2.00	6.00	2.00
6	4.00	4.00	4.00	12.00	4.00
Total	13.00	12.00	14.50		
Grand Total				39.50	
Grand Mean					2.19

Appendix Table 3a. ANOVA on number of Fruits/Panicla at Harvest

Sources of	Degrees	Sum of	Mean	F value	Pr>F
Variation	of	Squares	Squares		
	Freedom				
Rep	2	0.52777778	0.26388889	2.71	0.1144 ns
Trt	5	17.06944444	3.41388889	35.11	<.0001 **
Error	10	0.97222222	0.09722222		
Total	17	18.56944444			

CV= 14.20%

Appendix Table 4. Average Weight of Single Fruit (kg)

Treatments	Replication			Total	Mean
	Ι	II	III		
1	0.18	0.19	0.21	0.58	0.19
2	0.25	0.28	0.27	0.80	0.27
3	0.2	0.22	0.25	0.67	0.22
4	0.22	0.26	0.27	0.75	0.25
5	0.21	0.2	0.23	0.64	0.21
6	0.3	0.29	0.25	0.84	0.28
Total	1.36	1.44	1.48		
Grand Total				4.28	
Grand Mean					0.24

Appendix Table 4a. ANOVA on average Weight of Single Fruit (kg)

Sources of	Degrees	Sum of	Mean	F value	Pr>F
Variation	of	Squares	Squares		
	Freedom				
Rep	2	0.00124444	0.00062222	1.47	0.2748 ns
Trt	5	0.01664444	0.00332889	7.88	0.003 ***
Error	10	0.00422222	0.00042222		
Total	17	0.02211111			

CV= 8.64%

Treatments	Replication			Total	Mean
	Ι	II	III		
1	3.50	4.10	3.50	11.10	3.70
2	6.20	6.50	6.50	19.20	6.40
3	5.20	4.25	4.60	14.05	4.68
4	8.00	7.10	7.50	22.60	7.53
5	7.10	6.20	6.70	20.00	6.67
6	9.35	10.20	10.50	30.05	10.02
Total	39.35	38.35	39.30		
Grand Total				117.00	
Grand Mean					6.50

Appendix Table 5a. ANOVA on average Marketable Fruit/Tree

Sources of	Degrees	Sum of	Mean	F value	Pr>F
Variation	of	Squares	Squares		
	Freedom				
Rep	2	0.10583333	0.05291667	0.24	0.789 ns
Trt	5	73.83833333	14.76766667	67.72	<.0001 **
Error	10	2.18083333	0.21808333		
Total	17	76.125			

CV= 7.18%

Appendix Table 6. Average Unmarketable Fruit/Tree

Treatments	Replication			Total	Mean
	Ι	II	III	-	
1	1.30	1.50	1.20	4.00	1.33
2	2.30	2.10	2.30	6.70	2.23
3	1.50	1.80	1.60	4.90	1.63
4	2.30	2.70	2.25	7.25	2.42
5	2.60	2.50	2.10	7.20	2.40
6	2.70	3.10	2.50	8.30	2.77
Total	12.70	13.70	11.95		
Grand Total				38.35	
Grand Mean					2.13

Appendix Table 5a. ANOVA on Unmarketable Fruit/Tree

Sources of	Degrees	Sum of	Mean	F value	Pr>F
Variation	of	Squares	Squares		
	Freedom				
Rep	2	0.25694444	0.12847222	4.13	0.0494 ns
Trt	5	4.35736111	0.87147222	27.99	<.0001 **
Error	10	0.31138889	0.03113889		
Total	17	4.92569444			

CV= 8.28%



















