



**TITLE: EVALUATION OF AGRIPOWER HGDF AS AN ORGANIC FERTILIZER OF  
FRENCH BEANS IN KENYA.**

**SEASON 1 AND 2 REPORT.**

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## ABSTRACT

This report outlines the results of the efficacy trials conducted on behalf of GREEN WAVE Ltd for their proposed organic fertilizer “AGRIPOWER HGDF” for improved plant growth and higher yields of French beans in Kenya. The product was evaluated in the first season through two parallel field trials between December 2016 to February 2017 in Mwea, Kirinyaga County and Gatundu, Kiambu County in Kenya. The second season was conducted from April 2017 to May 2017. The experiment was designed as a Randomized Complete Block Design with eight treatments replicated three times. The treatments evaluated were: AGRIPower HGDF low rate (75 g/acre), AGRIPower HGDF medium rate (100 g/acre), AGRIPower HGDF high rate (125 g/acre), AGRIPower HGDF medium rate (100 g/acre) + D.A.P standard rate (108 Kg/ha), AGRIPower HGDF medium rate (100 g/acre) + ROTUBA (50 Kg/ha), ROTUBA standard rate (50 Kg/ha) and D.A.P + C.A.N standard rate. Untreated plots were also set up as control. AGRIPower HGDF was found to improve the growth of French beans in regards to plant height and number of leaves as well as increasing the yield. AGRIPower HGDF was noted to give better results when the dosage rate was increased and the best results obtained was when used in combination with D.A.P or ROTUBA. No phytotoxic effects were noted on all plants across the dosage rates tested. The study shows that AGRIPower HGDF was effective in promoting growth and boosting yield of French beans and therefore recommended for its registration as an organic fertilizer in Kenya at the rate of 100 g/acre in combination with D.A.P or ROTUBA.

**Key words:** AGRIPower HGDF, organic fertilizer, French beans

## 2.0 INTRODUCTION

French beans (*Phaseolus vulgaris* L.) is a major vegetable export crop in Kenya and a source of income to small scale farmers. This plant is cultivated due to its nutritional and culinary values. The crop is produced mostly by smallholder farmers and European Union is the main market. The major French bean production areas in Kenya are Athi River, Kirinyaga, Meru and Naivasha. Picking of French beans begins 9 weeks after sowing and continues for about 3 weeks when the weather is dry. French beans require an optimum temperature range of 16 - 25°C and friable loam soil that is well drained with high levels of organic matter and a pH of 6.5-7.5 (HCDA, 1996).

For the production of French beans apposite quantities of nutrients are needed for their growth and development. Otherwise physiological deficiency symptoms can occur. Over the years inorganic fertilizers have been widely used worldwide to support and optimize the growth of these vegetables. However, the use of organic fertilizer has gained more importance globally in the last few decades, due to efforts made for the conservation of agriculture. Organic fertilizers have been shown to help preserve natural resources and reduce degradation of ecosystem. As a result organic agriculture has become an alternative technology which encourages the use of natural organic compounds such as plant residues, manure, mulch and compost (Shannon *et al.* 2002). Application of these natural organic compounds have been shown to improve the soil nutritional state and as well as influencing other soil properties, such as aeration, water holding capacity and particles aggregation which contribute for better crop production, even with the use of little or without fertilizer application.

Most vegetable producers use inorganic fertilizers for better production due to its easy and rapid availability to plants. However the enduring use of synthetic fertilizers can eventually damage the soil chemical, physical and biological properties. Organic fertilizers, on the other hand, provide beneficial effects to the soil and also increase availability of nutrients, which helps to maintain the quality and yield of crops and are less expensive than inorganic fertilizers. Organic fertilizers are not only the source of organic matter and nutrient, but also boost microbial population, physical, biological and chemical properties of the soil. Organic fertilizers provide nutrients and organic matter within the soil and also ameliorate the water-holding capacity, firmness and structure of soil. They can improve the physical, chemical and biological properties of degraded or low fertility soil and also be the source of N, P and K for plants. It has also been reported that application of compost in soil decrease disease incidence (root rot of beans) and produce vigorous plants (*Cespedes et al. 2006*). Although organic crop production is not a new idea, there is still need to get more information regarding the organic cultivation of French beans. In this an attempt is made to evaluate the effects of AGRIPOWER HGDF on productivity of French beans

## **Test product**

AGRIPOWER Holy Grail Dry Formulation (HGDF) is a naturally organic Complete Plant Nutrition & Soil Rejuvenation System that delivers richer quality, healthier produce, greater yields, and hence higher profits. The ingredients are from nature's plants & organic minerals. The active ingredients act as a natural enzyme with plants to produce more chlorophyll that fosters nutrient uptake & thereby enhancing plant growth and yields. AGRIPOWER is loaded with nature's essential micro-nutrients. AGRIPOWER assists the beneficial bacteria in the soil in breaking down the organic matter in the soil into humus while also providing an additional long-term benefit in providing atmospheric nitrogen for plants and nutrients in the soil. It aids in the prevention of soil erosion, increases water-holding capacity in soil, and helps maintain a healthy growth (CFU) of soil bacteria, which in turn increases soil fertility and pH. AGRIPOWER provides short & long term plant nutrition as well as early initial growth.

The proposed organic fertilizer was AGRIPOWER HGDF for improved plant growth and higher yields on French beans in Kenya whereas ROTUBA and D.A.P were used as the standard products.

### **3.0 TRIAL OBJECTIVES**

- a. To evaluate the efficacy of AGRIPOWER HGDF as an organic fertilizer of French beans in Kenya.
- b. To determine the most effective rate of application of AGRIPOWER HGDF as an organic fertilizer of French beans in Kenya.

#### **4.0 JUSTIFICATION**

Exclusive use of chemical fertilizers cause decline in organic matter status and/or compost decrease crop yield which is not acceptable under the present agriculture system. Organic Farming has emerged as an important priority area globally in view of the growing demand for safe and healthy food and concerns on environmental pollution associated with the indiscriminate use of agro-chemicals. The present study is focused on developing an effective bio fertilizer from plant extract. This approach could help to obtain high yield potential and also reduce dependence on chemical fertilizers without compromising per unit yield French beans.

#### **5.0 METHODOLOGY**

##### **Description of Experimental site and experimental layout**

The first season trial was carried out in two sites where two parallel experiments were conducted; one was in Gatundu, Kiambu County and the other one in Mwea Kirinyaga County. Each trial was carried out on 1/4 acre piece of land. Land was ploughed and harrowed to a medium tilth. The seeds were sown at 15 cm by 30 cm intra-row spacing and directly done in the soil. The application was done at planting by drenching, 10 days after planting and 25 days after planting through foliar spray making a total of three applications. Untreated controls were drenched with water only, which was initiated at germination and crop emergence and continued as needed to maintain the French beans. Standard agronomic practices for French beans production in this two sites were adopted. The design of the experiment was randomized complete block design replicated 3 times with each plot measuring 16 M<sup>2</sup>. A spacing of 1M was left between treatments and 2M was left between replicates.

## **Assessments**

Assessment of progress of the experiment was carried out on a weekly basis and necessary observations made and data collected as specified in the PCPB approved protocol.

Visual assessment of performance of different treatments was done during each assessment to check for plant vigor and for phytotoxicity symptoms such as scorching, wilting, yellowing and die backs.

## **Termination of the trial**

The trial was terminated 45 days after planting and final data collected as specified in the protocol.

## **6.0 DATA COLLECTION**

In each treatment plots, five plants were selected at random and tagged. These were the plants used for data collection.

Data collected include;

- Germination percentage.
- Plant height.
- Number of leaves.
- Weight of pods per plot (Kgs)

## **7.0 DATA ANALYSIS**

Data collected was subjected to analysis of variance (ANOVA) using SAS. LSD was used to differentiate the means where necessary.

## **8.0 RESULTS AND DISCUSSION**

### **8.0.1. SEASON ONE RESULTS (MWEA SITE)**

**EVALUATION OF AGRIPOWER HGDF AS AN ORGANIC FERTILIZER ON FRENCH BEANS DURING THE FIRST SEASON**

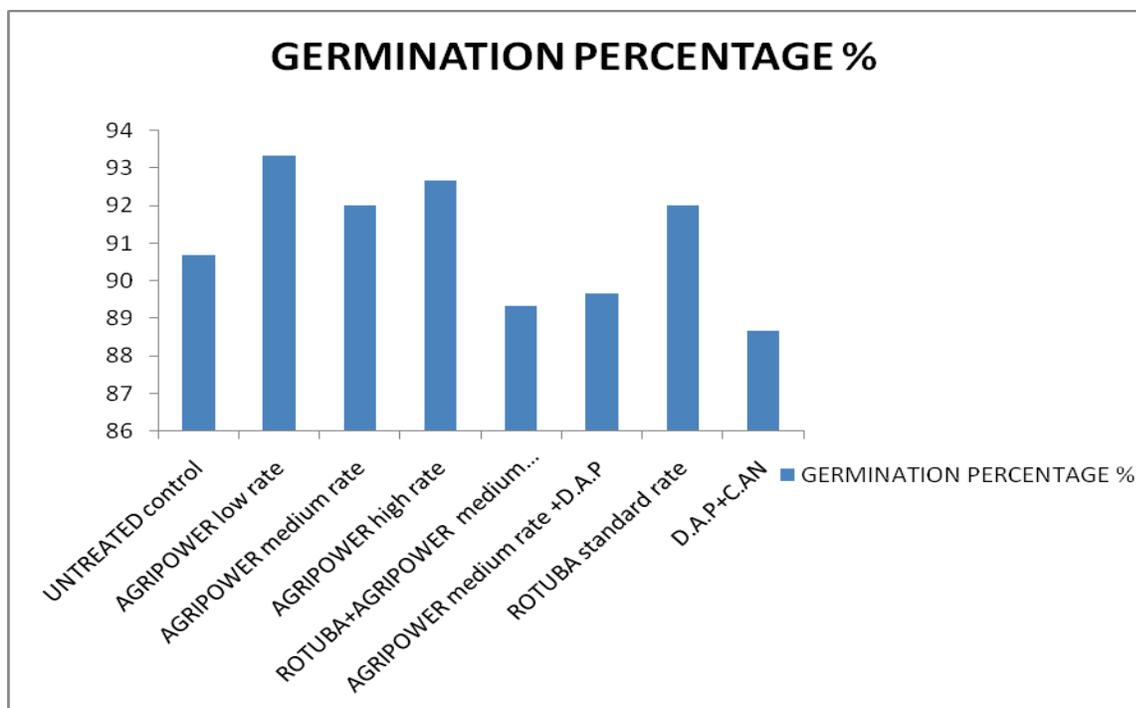
### Effects of treatments on germination percentage of French beans

There were no significant differences in germination percentage of French beans among all the treatments as shown in Table 1 below. All the treatments recorded above 88% germination percentage (Figure 1).

**Table 1: Effect of AGRIPower HGDF on germination percentage of French beans**

<b>TREATMENTS</b>	<b>GERMINATION PERCENTAGE %</b>
UNTREATED control	90.67 a
AGRIPower low rate	93.33 a
AGRIPower medium rate	92.00 a
AGRIPower high rate	92.67 a
AGRIPower medium rate + ROTUBA	89.33 a
AGRIPower medium rate + D.A.P	89.67 a
ROTUBA standard rate	92.00 a
D.A.P + C.AN	88.67 a
<b>LSD</b>	<b>7.813</b>

Means followed by the same small letters within the same column are not significantly different ( $p \leq 0.05$ ) according to Fisher's LSD test



**Fig 1: Effect of AGRIPOWER HGDF on germination percentage**

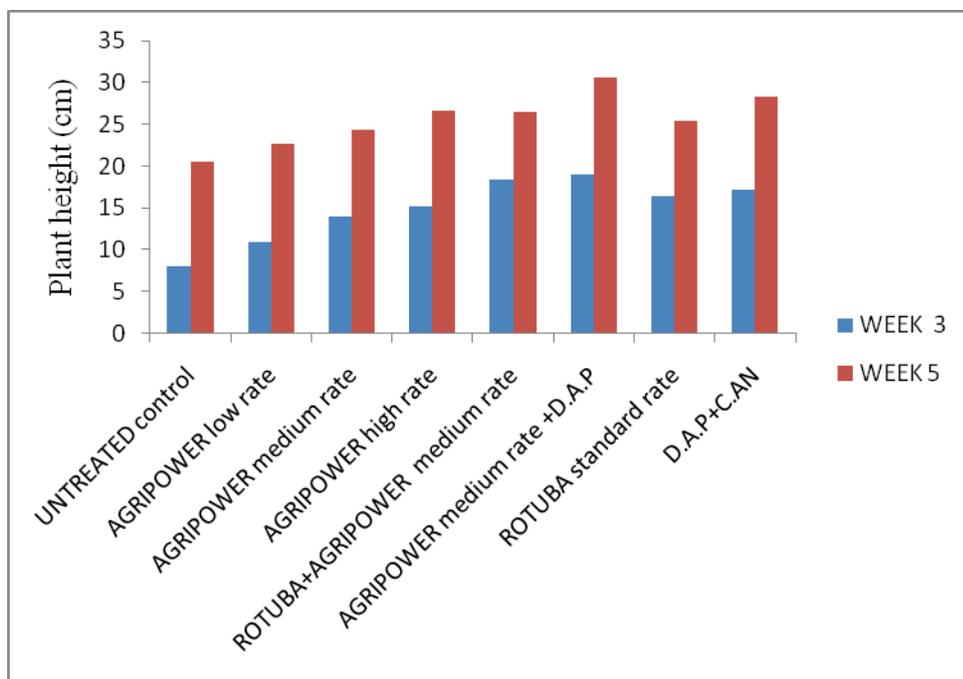
### **Effects of treatments on plant height of French beans**

There was significant difference in plant height of French beans recorded in the untreated and treated plots. The highest plant height was recorded in AGRIPOWER medium rate+ D.A.P treated plots followed by D.A.P + C.A.N treated plots while least was recorded in the untreated control (Figure 2). AGRIPOWER medium rate+ D.A.P was however not significantly different from AGRIPOWER medium rate + ROTUBA, AGRIPOWER high rate and D.A.P+C.AN by week 5 (Table 2). The percentage plant height increase ranged between 10-48%.

**Table 2: Effects of treatments on plant height of French beans**

TREATMENTS	PLANT HEIGHT (CM)		% INCREASE
	WEEK 3	WEEK 5	
UNTREATED control	8.03 e	20.53 d	-
AGRIPOWER low rate	10.87 d	22.60 cd	10.08
AGRIPOWER medium rate	13.90 c	24.33 cd	18.51
AGRIPOWER high rate	15.23 bc	26.57 abc	29.42
AGRIPOWER medium rate + ROTUBA	18.43 a	26.47 abc	28.93
AGRIPOWER medium rate +D.A.P	19.00 a	30.53 a	48.71
ROTUBA standard rate	16.47 abc	25.40 bc	23.72
D.A.P+C.AN	17.23 ab	28.30 ab	37.85
<b>L.S.D</b>	<b>2.663</b>	<b>4.686</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Fig 2: Effect of AGRIPOWER HGDF on plant height of French beans**

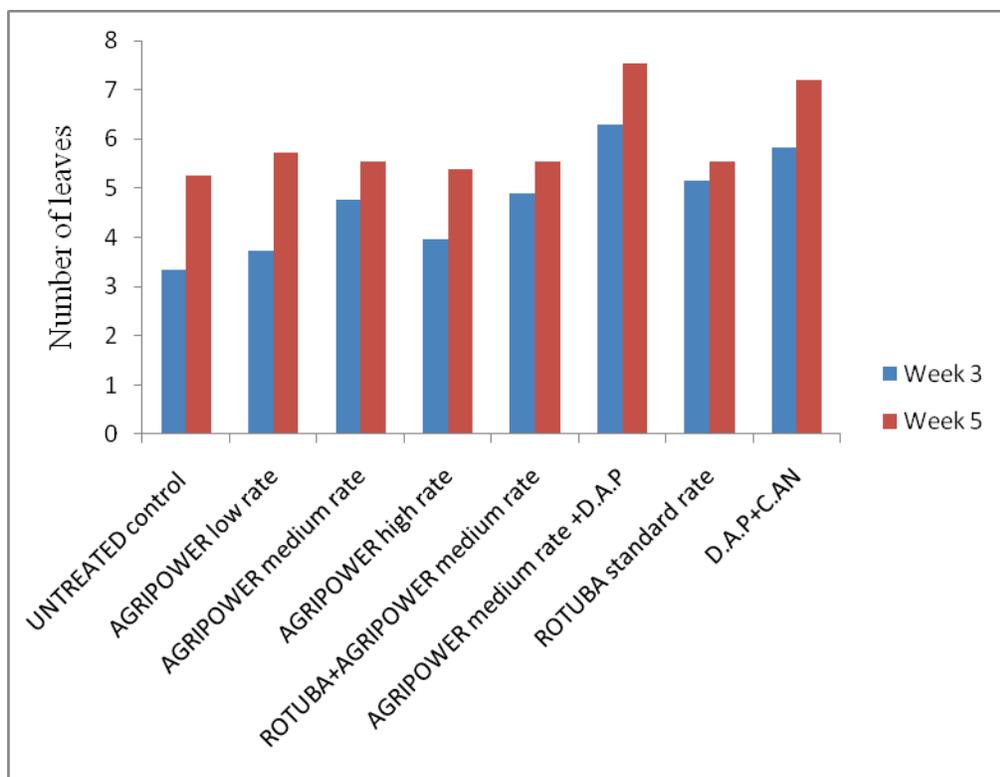
#### **Effects of treatments on number of leaves in French beans**

There was significant difference in the number of leaves recorded among the treatment groups three weeks after first application; however no significance difference was recorded five weeks after the first application (Table 3). The highest number of leaves was recorded in D.A.P + C.A.N treated plots while the least was recorded in the untreated control (Figure 3). A slight percentage increase in number of leaves against the untreated was recorded and ranged between 3 to 6% (Table 3).

**Table 3: Effects of treatments on number of leaves in French beans**

<b>Treatments</b>	<b>No. of leaves</b>		<b>% increase</b>
	<b>Week 3</b>	<b>Week 5</b>	
UNTREATED control	3.33 e	5.27 a	-
AGRIPOWER low rate	3.73 de	5.43 a	3.04
AGRIPOWER medium rate	4.767 bcd	5.53 a	4.93
AGRIPOWER high rate	3.97 cde	5.40 a	2.47
AGRIPOWER medium rate + ROTUBA	4.90 bcd	5.53 a	4.93
AGRIPOWER medium rate +D.A.P	5.30 a	5.53 a	4.93
ROTUBA standard rate	5.16 abc	5.53 a	4.93
D.A.P+C.AN	5.33 ab	5.60 a	6.26
<b>LSD</b>	<b>1.364</b>	<b>0.848</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Figure 3: Effects of AGRIPower HGDF on number of leaves in French beans.**

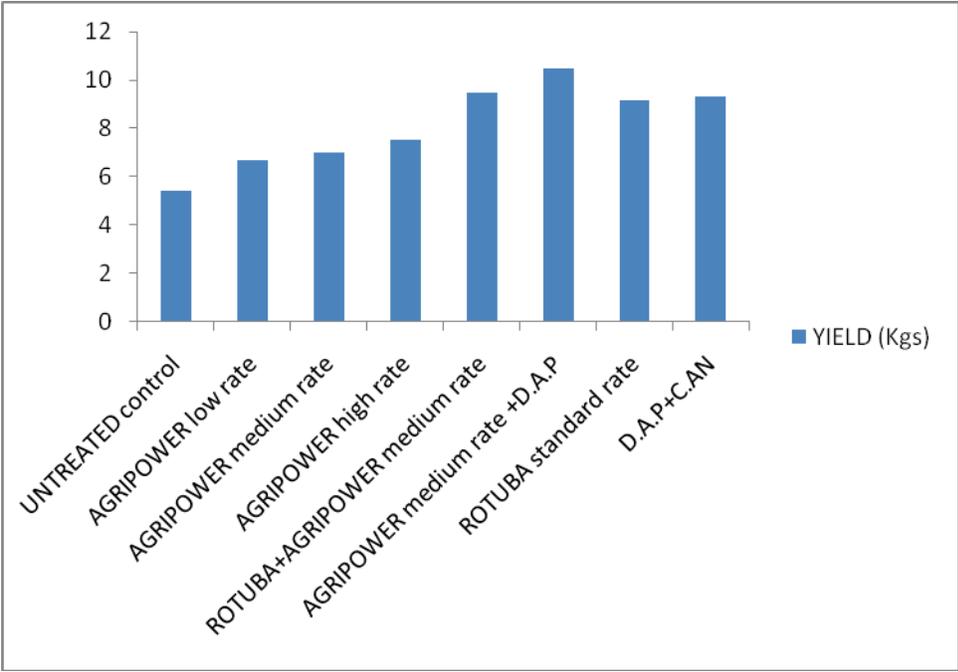
### **Effects of treatments on yield of French beans**

The yield of French beans differed significantly among the treatments, where the highest yield was recorded in AGRIPower medium rate + D.A.P treated plots followed by AGRIPower medium rate + ROTUBA treatment (Figure 4). AGRIPower medium rate + D.A.P was however not significantly different from AGRIPower medium rate + ROTUBA, ROTUBA standard rate and D.A.P+C.AN (Table 4). The percentage yield increase ranged between 23-94%.

**Table 4: Effects of treatments on weight of marketable pods of French beans**

<b>Treatments</b>	<b>Yield (kgs)</b>	<b>% increase</b>
UNTREATED control	5.40 d	-
AGRIPOWER low rate	6.67 cd	23.52
AGRIPOWER medium rate	7.00 cd	29.63
AGRIPOWER high rate	7.50 bc	38.89
AGRIPOWER medium rate + ROTUBA	9.50 a	75.93
AGRIPOWER medium rate + D.A.P	10.50 a	94.44
ROTUBA standard rate	9.17 ab	69.81
D.A.P+C.AN	9.33 ab	72.78
<b>LSD</b>	<b>1.907</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Figure 4: Effects of AGRIPOWER HGDF on yield of French beans**

## **8.0.2. SEASON ONE RESULTS (GATUNDU SITE)**

### **EVALUATION OF AGRIPOWER HGDF AS AN ORGANIC FERTILIZER ON FRENCH BEANS DURING THE FIRST SEASON**

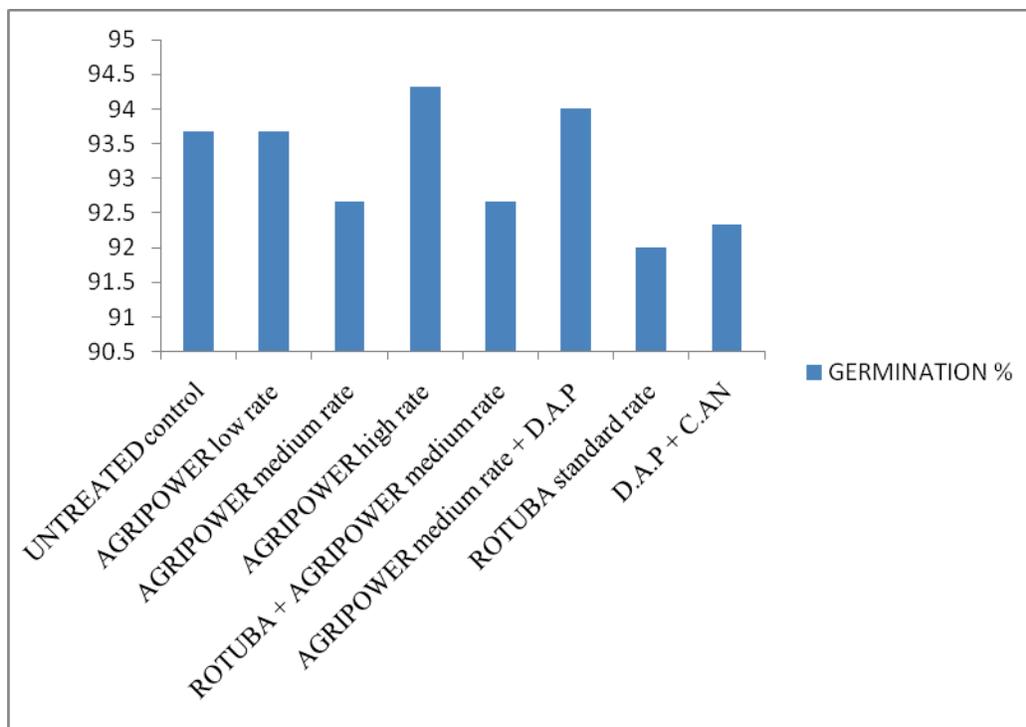
### Effects of treatments on germination percentage

No significant difference in germination percentage was recorded among all the treatments (Table 5). The germination percentage recorded was above 92% in all the treatment plots (Figure 5).

**Table 5: Effects of treatments on germination percentage**

<b>TREATMENTS</b>	<b>GERMINATION PERCENTAGE %</b>
UNTREATED control	93.67 a
AGRIPOWER low rate	93.67 a
AGRIPOWER medium rate	92.67 a
AGRIPOWER high rate	94.33 a
AGRIPOWER medium rate + ROTUBA	92.67 a
AGRIPOWER medium rate + D.A.P	94.00 a
ROTUBA standard rate	92.00 a
D.A.P + C.AN	92.33 a
<b>LSD</b>	<b>4.413</b>

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Figure 5: Effects of AGRIPOWER HGDF on germination percentage**

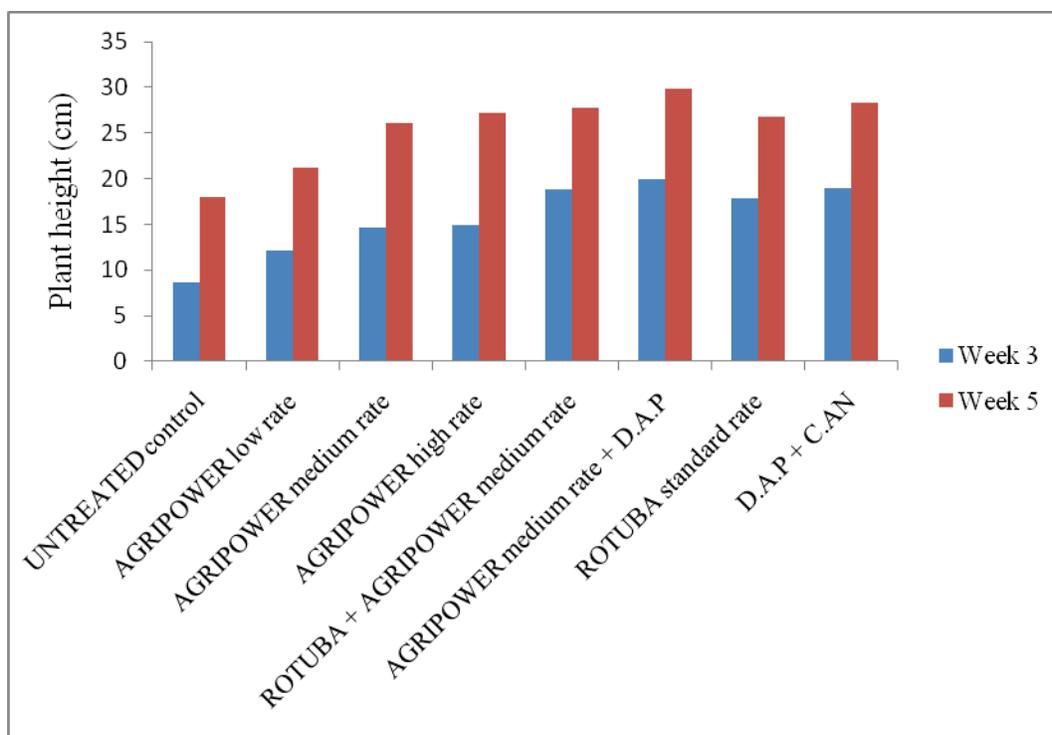
#### **Effects of treatments on plant height of French beans**

The plant height of French beans recorded in the untreated control differed significantly from all the treated plots. The untreated control recorded the least plant height of French beans followed by AGRIPOWER low rate in both week 3 and 5(Figure 6). The highest plant height was recorded in AGRIPOWER medium rate + D.A.P treated plots which was not significantly different from AGRIPOWER high rate, AGRIPOWER + ROTUBA, D.A.P + C.A.N and ROTUBA by week 5(Table 6). The percentage increase in plant height was over 34% (Table 6).

**Table 6: Effects of treatments on plant height of French beans**

<b>Treatments</b>	<b>Plant height (cm)</b>		<b>% increase</b>
	<b>Week 3</b>	<b>Week 5</b>	
UNTREATED control	8.70 d	18.00 c	-
AGRIPOWER low rate	12.10 cd	24.27 b	34.83
AGRIPOWER medium rate	14.67 bc	26.07 b	44.83
AGRIPOWER high rate	14.97 bc	27.20 ab	51.11
AGRIPOWER medium rate + ROTUBA	18.87 a	27.80 ab	54.44
AGRIPOWER medium rate + D.A.P	20.00 a	29.83 a	65.72
ROTUBA standard rate	17.80 ab	26.73 ab	48.50
D.A.P + C.AN	18.97 a	28.30 ab	57.22
<b>LSD</b>	<b>3.837</b>	<b>3.540</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Figure 6: Effects of AGRIPOWER HGDF on plant height of French beans**

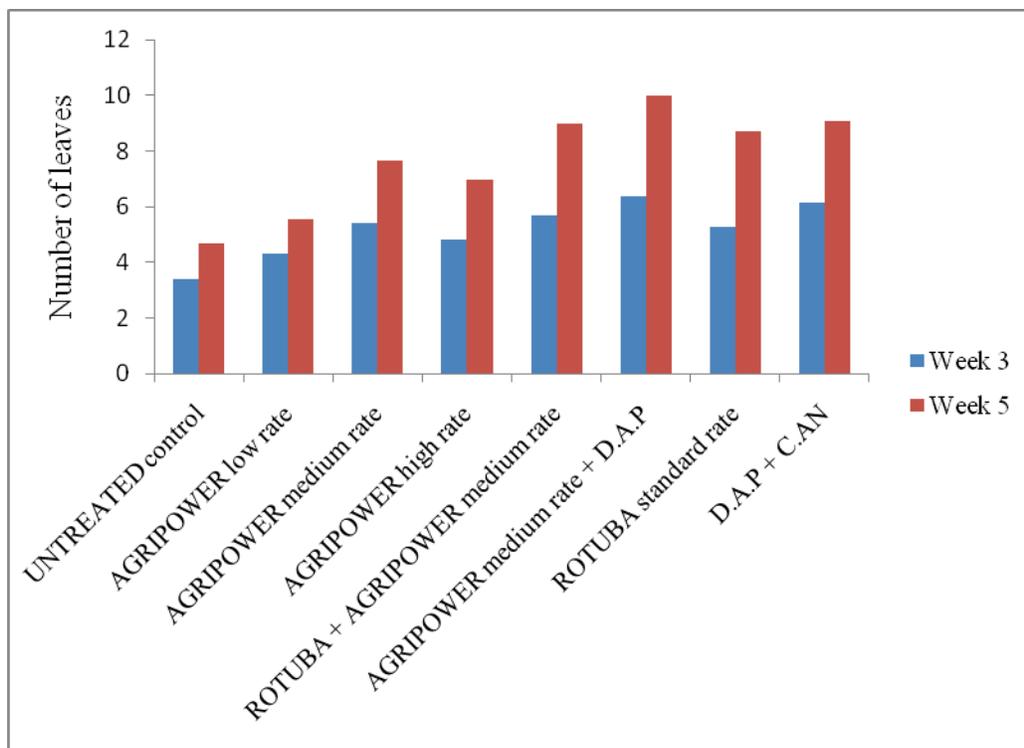
### **Effects of treatments on the number of leaves in French beans**

Results obtained showed that there were significant differences between the treated plots and the untreated plots (Table 7). The highest number of leaves was recorded in the AGRIPOWER medium rate + D.A.P treatment while the least was recorded in the untreated control (Figure 7). AGRIPOWER medium rate + D.A.P did not differ significantly with AGRIPOWER medium rate, AGRIPOWER high rate, AGRIPOWER medium rate + ROTUBA, ROTUBA and D.A.P + C.AN by week 5.

**Table 7: Effects of treatments on number of leaves in French beans**

<b>Treatments</b>	<b>No. Of leaves</b>		<b>% increase</b>
	<b>Week 3</b>	<b>Week 5</b>	
UNTREATED control	3.40 d	4.70 c	-
AGRIPOWER low rate	4.30 cd	5.57 bc	18.51
AGRIPOWER medium rate	5.40 abc	7.67 abc	63.19
AGRIPOWER high rate	4.80 bcd	6.97 abc	48.30
AGRIPOWER medium rate + ROTUBA	5.667 abc	9.00 ab	91.48
AGRIPOWER medium rate + D.A.P	6.367 a	10.00 a	112.77
ROTUBA standard rate	5.267 abc	8.70 ab	85.11
D.A.P + C.AN	6.167 ab	9.07 ab	92.98
<b>LSD</b>	<b>1.442</b>	<b>2.873</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Figure 7: Effects of AGRIPOWER HGDF on number of leaves of French beans**

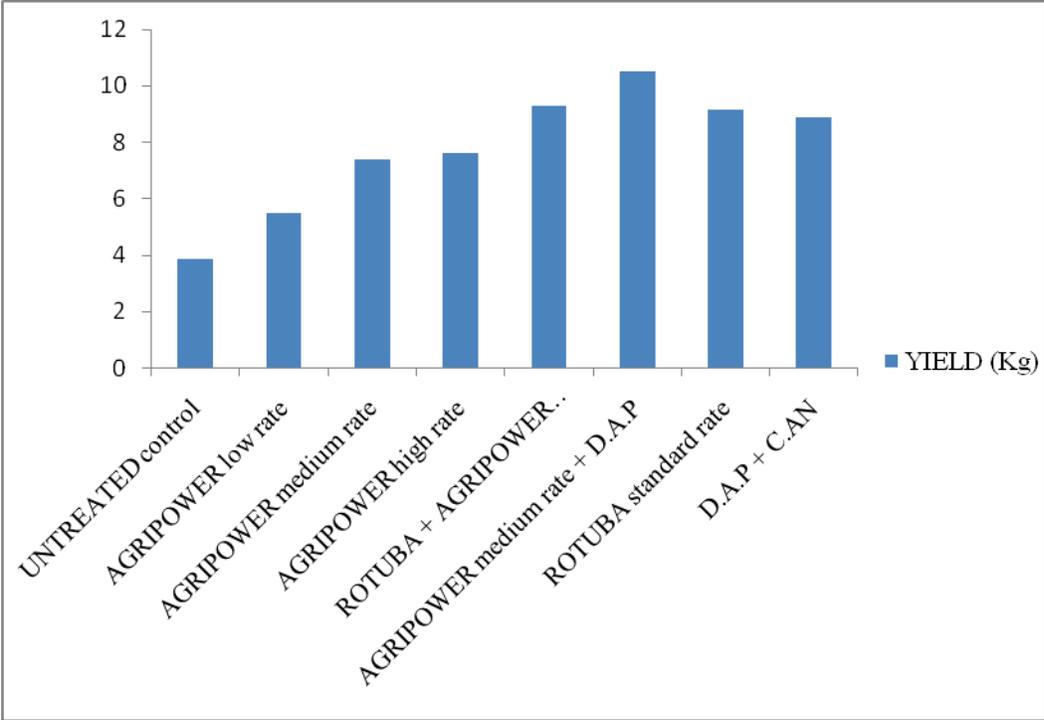
### **Effects of treatments on yield of French beans**

The weight of marketable pods of French beans recorded in the untreated control was the least and was significantly different from the yield recorded in the treated plots (Table 8). Among the treated plots the AGRIPOWER low rate recorded the lowest weight of marketable pods and differed significantly from the other treated plots (Figure 8). On the other hand, the highest yield was recorded in AGRIPOWER medium rate + D.A.P treated plots. The percentage increase in yield recorded ranged between 42-171% where AGRIPOWER medium rate + D.A.P recorded the highest (Table 8).

**Table 8: Effects of treatments on yield of French beans**

<b>Treatments</b>	<b>Yield (kg)</b>	<b>% increase</b>
UNTREATED control	3.87 f	-
AGRIPOWER low rate	5.50 e	42.12
AGRIPOWER medium rate	7.40 d	91.21
AGRIPOWER high rate	7.60 cd	96.38
AGRIPOWER medium rate + ROTUBA	9.30 ab	140.31
AGRIPOWER medium rate + D.A.P	10.50 a	171.32
ROTUBA standard rate	9.167 ab	136.87
D.A.P + C.AN	8.90 bc	129.97
<b>LSD</b>	<b>1.361</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Figure 8: Effects of AGRIPOWER HGDF on yield of French beans**

### **8.0.3. SEASON TWO RESULTS (MWEA SITE)**

**EVALUATION OF AGRIPOWER HGDF AS AN ORGANIC FERTILIZER ON FRENCH BEANS DURING THE SECOND SEASON**

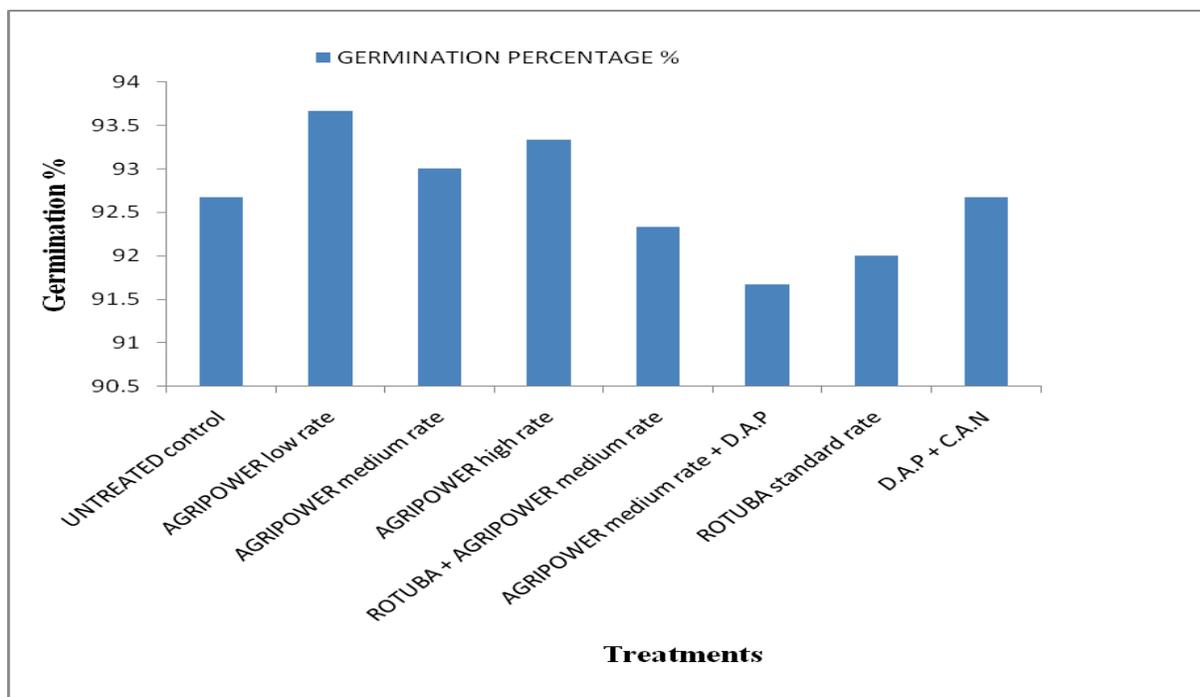
### Effects of treatments on germination percentage

The germination percentage recorded in the eight treatments did not differ significantly from each other. (Table 9). The germination percentage recorded was above 91% in all the treatment plots (Fig 9).

**Table 9: Effects of treatments on germination percentage**

<b>TREATMENTS</b>	<b>GERMINATION PERCENTAGE %</b>
UNTREATED control	92.67 a
AGRIPOWER low rate	93.67 a
AGRIPOWER medium rate	93.00 a
AGRIPOWER high rate	93.33 a
AGRIPOWER medium rate + ROTUBA	92.33 a
AGRIPOWER medium rate + D.A.P	91.67 a
ROTUBA standard rate	92.00 a
D.A.P + C.A.N	92.67 a
<b>LSD</b>	<b>3.5155</b>

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Fig 9.Effect of treatments on germination percentage**

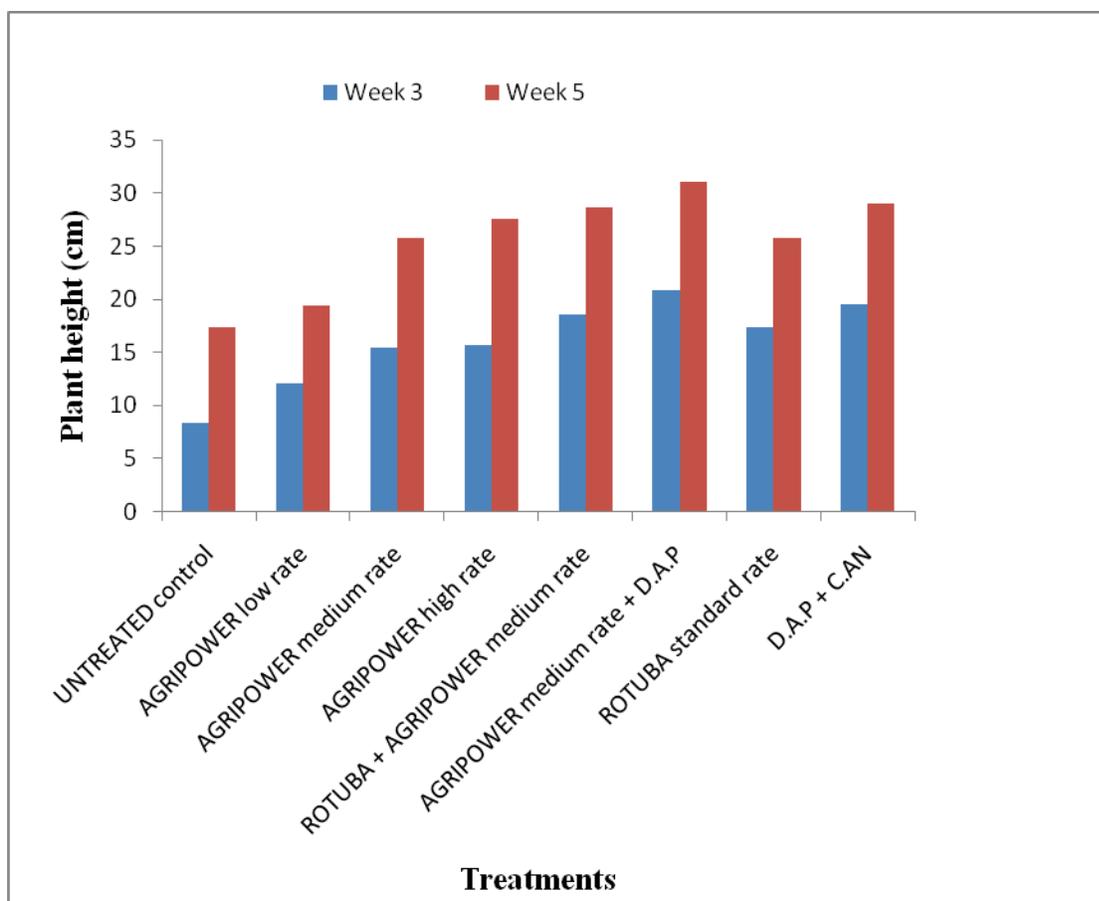
### **Effect of treatments on plant height of French beans**

The plant height in the untreated control differed significantly from all the treated plots. The least plant height was recorded in the untreated control followed by AGRIPOWER low rate (figure 10). AGRIPOWER medium rate+ D.A.P recorded the highest plant height, followed by D.A.P + C.A.N .The percentage increase in plant height ranged between 11-78% (Table 10).

**Table 10: Effect of treatments on plant height of French beans**

Treatments	Plant height (cm)		% increase
	Week 3	Week 5	
UNTREATED control	8.30 f	17.37 f	-
AGRIPOWER low rate	12.03 e	19.43 e	11.86
AGRIPOWER medium rate	15.43 d	25.73 d	48.13
AGRIPOWER high rate	15.67 cd	27.57 bc	58.72
AGRIPOWER medium rate + ROTUBA	18.60 abc	28.63 b	64.82
AGRIPOWER medium rate + D.A.P	20.87 a	31.07 a	78.87
ROTUBA standard rate	17.33 bcd	25.83 cd	48.70
D.A.P + C.AN	19.50 ab	29.00 b	66.95
<b>LSD</b>	<b>3.046</b>	<b>1.743</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Fig 10: Effect of treatments on plant height of French beans**

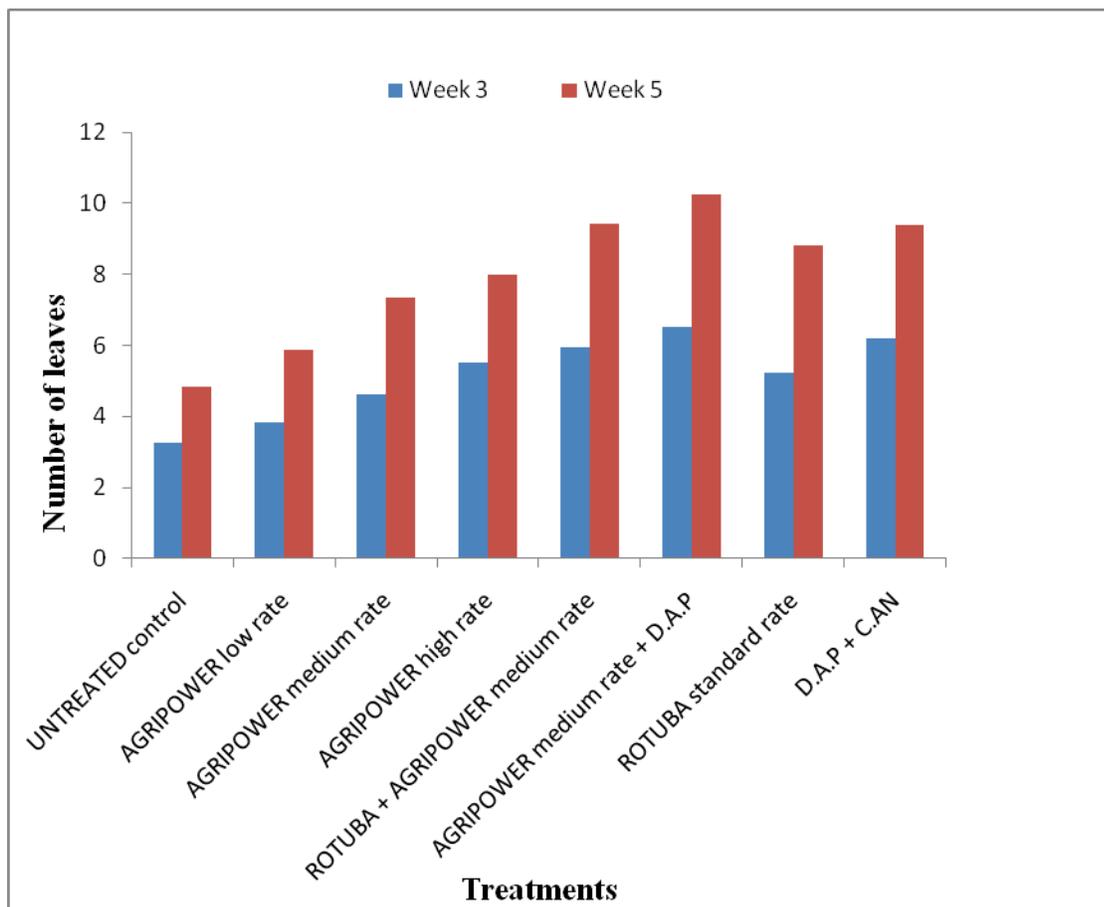
#### **Effect of treatments on number of leaves**

The number of leaves in the untreated control differed significantly from the treated plots. The least number of leaves was recorded in untreated control while the highest number of leaves was recorded in AGRIPOWER medium rate+ D.A.P which was not significantly different from D.A.P+C.A.N, ROTUBA standard rate, AGRIPOWER medium rate + ROTUBA, AGRIPOWER high rate and AGRIPOWER medium rate. The percentage increase on number of leaves ranged between 21-118%. (Table 11)

**Table 11: Effects of treatments on number of leaves**

<b>Treatments</b>	<b>No. of leaves</b>		<b>% increase</b>
	<b>Week 3</b>	<b>Week 5</b>	
UNTREATED control	3.27 e	4.83 c	-
AGRIPOWER low rate	3.83 ed	5.87 bc	21.53
AGRIPOWER medium rate	4.63 cd	7.33 abc	51.76
AGRIPOWER high rate	5.53 abc	8.00 abc	65.63
AGRIPOWER medium rate + ROTUBA	5.93 ab	9.43 a	95.23
AGRIPOWER medium rate + D.A.P	6.53 a	10.23 a	111.80
ROTUBA standard rate	5.23 bc	8.80 ab	82.19
D.A.P + C.AN	6.20 ab	9.37 a	93.99
<b>LSD</b>	<b>1.280</b>	<b>3.170</b>	-

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Fig 11: Effect of treatments on number of leaves**

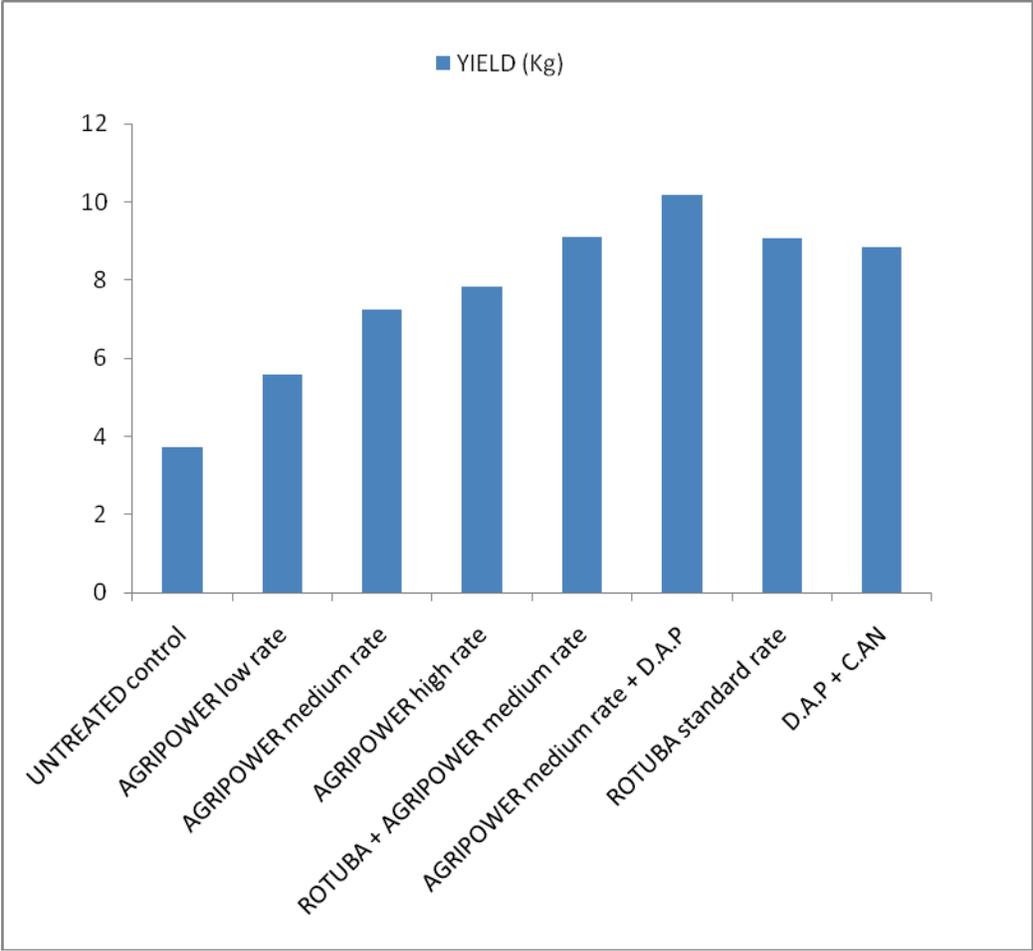
### **Effect of treatments on yield of French beans**

Untreated control plots recorded the least weight of marketable pods and this was significantly different from the other treated plots. Among the plots treated with AGRIPOWER, AGRIPOWER low rate recorded the least yield of French beans while AGRIPOWER medium rate+ D.A.P recorded the highest yield (figure 12).The weight recorded in AGRIPOWER medium rate+ D.A.P was not significantly different from AGRIPOWER medium rate+ ROTUBA and ROTUBA standard rate (Table 12).

**Table 12: Effect of treatments on yield of French beans**

<b>Treatments</b>	<b>Yield (kg)</b>	<b>% increase</b>
UNTREATED control	3.73 f	-
AGRIPOWER low rate	5.57 e	49.33
AGRIPOWER medium rate	7.23 d	93.83
AGRIPOWER high rate	7.83 cd	109.91
ROTUBA + AGRIPOWER medium rate	9.1 ab	143.97
AGRIPOWER medium rate + D.A.P	10.17 a	172.65
ROTUBA standard rate	9.07 ab	143.16
D.A.P + C.AN	8.83 bc	136.73
<b>LSD</b>	<b>1.734</b>	<b>-</b>

Means followed by the same small letters within the same column are not significantly different (Fisher's LSD,  $p > 0.05$ )



**Fig 12: Effect of treatments on yield of French beans**

**9.0 PHYTOTOXICITY**

No phytotoxicity was noted on the French beans throughout the trials.

## **10.0 GENERAL DISCUSSION**

The results obtained from the trial indicated that AGRIPOWER improved the results of French beans in terms of the number of leaves, plant height and yield during the three trials. AGRIPOWER medium rate+ DAP however had a higher field efficacy in the growth parameters of French beans in the three trials when compared to all other treatments. The results obtained from AGRIPOWER medium rate+ DAP were however not significantly different from that obtained from AGRIPOWER medium rate + ROTUBA, CAN+DAP standard rate and ROTUBA standard rate. Higher yields were also obtained in plots treated with AGRIPOWER when compared to the untreated plots. AGRIPOWER combined with DAP or ROTUBA however produced better yields results when compared to the plots treated with only AGRIPOWER. Among the treatments treated only with AGRIPOWER, AGRIPOWER medium rate and high rate recorded higher efficacy when compared to AGRIPOWER low rate. This is an indication that AGRIPOWER was effective but its performance is dependent on the dosage rates. There was no phytotoxicity symptoms noted on French beans in all the treated plots. AGRIPOWER can be therefore used as an organic fertilizer for improvement of growth and yield of French beans in Kenya.

## **11.0 CONCLUSION**

Based on findings from this study, it can be concluded that AGRIPOWER medium rate combined with either ROTUBA or DAP improved the growth and yield of French beans when compared to all other treatments.

## **12.0 RECOMMENDATION**

AGRIPOWER was found to be an effective organic fertilizer of French beans in Kenya and is therefore recommended for registration at the application rate of 100 g/acre to be used in combination with ROTUBA or DAP.

## **13.0 ACKNOWLEDGEMENTS**

Special thanks to KSTCIE for commissioning us to conduct trials on AGRIPOWER and to Green wave Limited for providing the funds. Thanks to Mr. John (Mwea, Kirinyaga county) and Mr. Charles Kungu(Gatundu, Kiambu county) for allowing us to use their farms for conducting trials. The technical assistance of Edna Gitonga, Ann Kariuki and Grace Githiri is highly appreciated.

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