Effects of Variety and Poultry Manure on Growth and Yield of Selected Cowpea (Vigna unguiculata (L)Walp) Varieties at Makurdi, Nigeria

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Abstract- A field study was conducted at the Teaching and Research Farm, University of Agriculture, Makurdi in 2013 and 2014 cropping seasons. The objective was to determine the effects of variety and rate of poultry manure application on four varieties of cowpea viz: IT98K- 573 – 2 – 1, UAM 091056 – 2, UAM1046 – 6 – 2 and IT89KD – 391. The four varieties of cowpea and four rates of poultry manure: 0t/ha, 2t/ha, 4t/ha and 6t/ha constituted the treatments. Growth and yield parameters taken at 4, 6, and 8 weeks after planting and at harvest maturity included : plant height, number of leaves, pod length, number of pods per plant, number of seeds per plant, total dry matter yield, 100 seed weight and total seed yield. Results showed that varieties and rates of poultry manure exerted significant effects on the growth and yield of cowpea. Variety UAM 091046 -6 -2 produced the longest pod length, number of seeds per plant, 100 seed yield, number of pods per plant and total dry matter yield ; but IT98KD – 573-2-1 had the highest seed yield (837. 40 kg/ha). The application of 2t/ha of poultry manure yielded the longest pod length , number of pods per plant , and number of seeds per plant ; while 4t/ha produced the highest total dry matter yield, 100 seed weight and seed yield. Results indicated that 4t/ha x IT98KD-573-2-1 interaction gave the highest seed yield (888.80kg/ha). Varieties UAM 091046-6-2 and IT98KD-573-2-1 showed greater potential for seed production than other varieties and should be adopted by farmers under Makurdi favourable weather conditions.

Index Terms- effects, variety, seed science, seedling emergence, characteristics, soybean

I. INTRODUCTION

Cowpea (Vigna unguiculata (L) Walp) is the most important food legume in Sub Saharan Africa (Morti-more et al., 1997).

Conservative estimates suggest that 12.5 million hectares of cowpea are planted annually around the world. Of this area, about 9.8 million hectares are planted in Africa, making it the region with the largest production and consumption of cowpea in the world (CGAIR, 2001). Nigeria produces about 2.1 million tons of cowpea, making it the World largest producer followed by Niger, 650,000 tons; and Mali, 110,000 tons (IITA,2004).

According to Adeyemi et al. (2012), cowpea and other grain legumes are the essential sources of protein for about 700 million people, particularly in the developing countries of Latin America , Asia and Africa, Nigeria inclusive where plants provide 83% of total protein in the average diet. The crude protein from seeds and leaves of cowpea range between 23 and 32%, and between 13 and 17% respectively (Diouf, 2011). Cowpea pods and leaves also serve as fodder for livestock (Ghady and Alkoaiki, 2010; Abebe et al, 2005).

Inherent poor soil fertility and depletion of soil nutrients because of continuous cultivation and crop removal have been reported to hinder promising crop production (Kisetu et al, 2013). In addition, nutrients level are also depleted in soils through physical soil loss by erosion, leaching of nutrients from agricultural fields and nutrient mining by crop and crop harvest (Kisetu and Teveli, 2013). The use of organic manures, inorganic fertilizers and leguminous crops has been advocated to restore the nutrients in lost soils (Fening et al., 2005). Organic manures help in conditioning the physical properties of the soil thereby increasing crop productivity.

Inorganic fertilizers in Nigeria are not obtained at the right time and are at higher cost which are not affordable to small holder farmers who are basically producing at subsistence. Because the country is endowed with large quantities of animal manures such as from cattle , goats, pigs and poultry (Kimbi et al., 2001), these could be used as alternative sources of nutrients in crop production. However, the appropriate rates to be applied are still debatable and highly controversial because of high variation in nutrient composition (Suthamathy and Seran, 2013; Njaguma, 2002). Awodun et al. (2007) argued that poultry droppings recommendation for most leafy and fruit vegetables is to supply 110kg N, 90 kg P_2O_5 and 90 kg K_2O t/ha-1. This is a fixed rate of manure which does not provide sufficient ranges of nutrient requirements for most crops. The objective of this study was to determine the rate of poultry manure and the cowpea variety that will produce optimum growth and yield.

II. MATERIALS AND METHODS

Experimental Site:

The field study was conducted during the 2013 and 2014 cropping seasons at the Teaching and Research Farm, University of Agriculture , Makurdi located in the Southern Guinea Savannah ecological zone of Nigeria (latitude 7.41oN and longitude 8. 37oE) and at 97m above sea level (Kowal and Kassan, 1978; Agboola, 1979). Weather conditions and soil physical and chemical characteristics at Makurdi in 2013 and 2014 seasons were determined and recorded.

Materials:

Four cowpea varieties namely : IT98K-573-2-1, UAM 091056-2, IT89KD- 391 and UAM 091046-6-2 were obtained from the gene bank of University of Agriculture , Makurdi. Dress Force (seed dressing chemical) purchased from agrochemical store was used to treat seeds against ants, aphids, termites, downy mildew, loose smut and damping off. Poultry manure, collected from Teaching and Research Farm, University of Agriculture, Makurdi was used to determine its effect on growth and yield.

Methods:

The experimental field previously lying fallow was cleared , ridged manually and consisted of twelve plots with a gross plot size of 15m x 10m (150m^2), each plot consisted of four ridges , 0.5m apart and each ridge was 4m long. Two seeds were planted per hole and spaced 30cm x 30cm.

Weed control was achieved by application of Codal 400 E.C. (200g metolachlor, 200g pendimethane) per 20 litres of water. This was followed by hoe weeding at the onset of flowering. Pests were controlled using ‘ Best Vetox 85 ‘ insecticide at the rate of 50ml per 20 litres of water. Spraying started at the onset of flowering and continued at weekly intervals until pod maturity to minimize damages by weevils, stem borers, aphids, grasshoppers and leaf rollers.

Data were collected from four randomly selected plants in each net plot and recorded as

Follows:

- Pant height (cm) at 4, 6, and 8 WAP.
- Number of leaves at 4, 6, and 8 WAP.
- Number of pods per plant.
- Pod length per plant (cm).
- Number of seeds per plant.
- 100 seed weight (g).
- Total dry weight of plant (g).
- Seed yield (kg/ha).

Treatments and Experimental Design:

Four cowpea varieties viz: UAM 091046- 6-2, UAM 091056- 2, IT89KD- 391, IT98K- 573-2-1 and four rates of poultry manure: 0 t/ha, 2 t/ha, 4 t/ha and 6 t/ha constituted the treatments used. The study was laid out in a 4x4 factorial arranged in Randomized Complete Block Design (RCBD) with three replications.

Statistical Analysis:

All the data were analyzed statistically using the Analysis of Variance Procedure (ANOVA) described by Singh and Chaudhary (1979) ; Steel and Torrie (1980). Treatment effects were compared by the Fisher’s Least Significant Difference Procedure (F-LSD) at 5% level of significance described by Little and Hill (1978) ; Steel and Torrie (1980). GenStat Release Version 2009 was used for analysis.

III. RESULTS

Plant Height:

The four varieties of cowpea differed significantly in plant height at 6 and 8 weeks after planting (WAP), but were not significantly different at 4 WAP (Table 1). At 6 WAP, variety IT98K-573-2-1 produced the highest plant height of 63.47 cm, while IT89KD-391 gave the lowest plant height of 35.69 cm. The highest plant height (63.09cm) and lowest plant height (44.00cm) were recorded at 8 WAP with IT89KD-391 and UAM 091046-6-2 respectively.

Number of Leaves:

The effects of variety on number of leaves (Table 1) were not significant at 4 and 6 WAP, but was significant at 8 WAP with IT89KD-391 having significantly higher number of leaves (80.70) compared to other varieties, and UAM 091046-6-2 having the lowest number of leaves (24.60).

Effects of Variety on the Yield of Cowpea

Pod Length:

Results on effects of variety on yield parameters of cowpea are summarized in Table 2. The four varieties differed significantly in pod length with UAM 091046-6-2 having the longest pod length of 19.88 cm and UAM 091056-2 having the shortest pod length of 13.50 cm.

Number of Pods Per Plant:

In Table 2, variety UAM 091046-6-2 produced 19.83 pods per plant which was significantly higher and different compared to UAM 091056-2 with lower number of pods per plant (13.42). Variety IT98K-573-2-1 ranked second with 18.83 pods per plant.

Number of Seeds Per Plant:

Significantly different and higher number of seeds per plant (167.45) were observed with variety UAM 091046-6-2 when compared to other varieties. Variety UAM 091056-2 recorded the lowest number of pods per plant (119.82).

Total Dry Matter Yield :

The four varieties of cowpea differed significantly in total dry matter yield, with variety UAM 091046-6-2 being significantly higher in total dry matter yield (28.70 g). Variety IT98K-573-2-1 produced the lowest total dry matter yield of 18.00 g (Table 2).

100 Seed Weight :

As presented in Table 2, the effects of variety on 100 seed weight was not significant, but UAM 091046-6-2 gave higher 100 seed weight of 17.64 g.

Seed Yield :

Significant difference in seed yield was observed among the varieties (Table 2). Variety IT98K-573-2-1 recorded significantly higher seed yield of 837.40 kg/ha compared to other varieties, while UAM 091056-2 gave the lowest seed yield of 538.80 kg/ha.

Effects of Variety x Rate Interaction on the Growth of Cowpea

Plant Height :

Results in Table 3 show that variety x rate interaction on plant height was significant at 4, 6 and 8 WAP. At 4 WAP,

IT89KD-391 x 0 t/ha interaction gave the highest plant height of 29.72 cm, while IT98K-573-2-1 x 4 t/ha interaction gave the lowest plant height (16.46 cm). At 6 WAP, IT98K-573-2-1 x 2 t/ha produced the highest plant height (82.33 cm) and IT89KD-391 x 4 t/ha, the lowest plant height (21.50 cm). At 8 WAP, IT89KD-391 x 0 t/ha interaction was significantly higher in plant height (96.74 cm), while IT98K-573-2-1 x 0 t/ha gave the lowest plant height of 35.59 cm.

Number of Leaves:

Table 3 also shows that variety x rate interaction exerted significant effects on number of leaves at 4 to 8 WAP. At 4 WAP, IT89KD-391 gave significantly higher number of leaves (35.67) when 6 t/ha of poultry manure was applied. Variety UAM 091056-2 gave the lowest number of leaves (15.67) at application rate of 0 t/ha. At 6 WAP, IT89KD-391 produced significantly higher number of leaves (86.00) with 0 t/ha application rate, while IT89KD-391 gave the lowest number of leaves (25.00) when 2 t/ha of poultry manure was applied. At 8 WAP, IT89KD-391 gave significantly higher number of leaves (120.30) when 6 t/ha of poultry manure was applied to it, but UAM 091056-2 gave significantly lower number of leaves (21.30) at 2 t/ha of poultry manure.

Effects of Variety x Rate Interaction on The Yield of Cowpea

Pod Length :

Results in Table 4 show that the four cowpea varieties differed significantly in pod length, but IT89KD-391 had longer pods (22.50 cm) when 6 t/ha of poultry manure was applied. Variety UAM 091056-2 produced pods with shorter length (11.30 cm) at application rate of 0 t/ha.

Number of Pods Per Plant:

Results of variety x rate interaction on number of pods per plant are also presented in Table 4. Variety IT89KD-391 was significantly higher in number of pods per plant (22.67) at application rate of 6 t/ha, while UAM 091056-2 gave the lowest number of pods per plant (11.33) at application rate of 0 t/ha.

Number of Seeds Per Plant:

UAM 091046-6-2 x 0 t/ha interaction produced significantly higher number of seeds per plant (205.27) followed by UAM 091046-6-2 x 2 t/ha interaction (177.68). Lower number of seeds per plant (92.67) were observed under UAM 091056-2 x 6 t/ha interaction.

Total Dry Matter Yield :

The interaction effect of variety and rate on total dry matter yield was not significant, but UAM 091046-6-2 produced higher total dry matter yield (33.50 g) when 4 t/ha of poultry manure was applied. The IT98K-573-2-1 x 0 t/ha interaction gave lower total dry matter yield of 14.50 g.

100 Seed Weight :

In Table 6, variety x rate interaction on seed weight was significant with UAM 091046-6-2 giving the highest 100 seed weight of 18.60 g when 2 t/ha of poultry manure was applied, while UAM 091056-2 gave the lowest seed weight (16.37 g) at poultry manure application rate of 0 t/ha.

Seed Yield :

Variety IT98K-573-2-1 x 4 t/ha interaction produced significantly higher seed yield of 888.80 kg/ha compared to other variety and rate interactions. While UAM 091056-2 produced the lowest seed yield of 528.10 kg/ha at application rate of 0 t/ha.

Effects of Rates of Poultry Manure on The Growth of Cowpea

Plant Height :

The four rates of poultry manure differed significantly in plant height at 4, 6 and 8 WAP (Table 2). However, the application of 0 t/ha yielded plant heights of 22.62 cm, 54.56 cm and 58.22 cm at 4, 6 and 8 WAP respectively, which were significantly higher and different when compared to other rates of application. There was a steady increase in plant height from 4 to 8 WAP with all rates of poultry manure application.

Number of Leaves:

In Table 2, the four rates of poultry manure differed significantly in number of leaves at 4 and 8 WAP but were not significantly different at 6 WAP. The highest number of leaves (28.67 and 77.80) were recorded at 4 and 8 WAP when 6 t/ha of poultry manure was applied and differed significantly from the number of leaves produced when other application rates were used. Lower number of leaves were observed with 4 t/ha (21.50) and 0 t/ha (22.17) at 4 WAP.

Effects of Rates of Poultry Manure On The Yield of Cowpea

Pod Length :

Results summarized in Table 5 show that the longest pod length of 18.02 cm was observed when 2 t/ha of poultry manure was applied and was significantly different from the pod length of other rates .The application rate of 6 t/ha gave the lowest pod length of 17.60 cm.

Number of Pods Per Plant:

The four rates of poultry manure were not significantly different in number of pods per plant, but 2 t/ha ranked higher in number of pods per plant (17.82).

Number of Seeds Per Plant:

Table 5 indicates that 0 t/ha of poultry manure produced significantly higher number of seeds per plant (153.86) than other rates. This was followed by 4 t/ha of poultry manure which gave 153.03 seeds per plant. Lower number of seeds per plant were observed with 6 t/ha of poultry manure.

Total Dry Matter Yield :

Results on total dry matter yield are also presented in Table 5. Higher total dry matter yield (25.60 g) was observed with 4 t/ha of poultry manure but it was not significantly different when compared with other rates. The control (0 t/ha) gave the lowest total dry matter yield of 20.30 g .

100 Seed Weight (g)

The rates of poultry manure significantly affected 100 seed weight. Application of 4t/ha had significantly higher 100 seed weight of 18.05 g and 6t/ha produced the lowest 100 seed weight of 16.92 g.

Seed Yield :

At an application rate of 4 t/ha, a significantly higher seed yield of 685.90 kg/ha was recorded compared to other rates and the lowest seed yield (652.00 kg/ha) was obtained when 0 t/ha of poultry manure was applied.

DISCUSSION

Effects Of Variety On The Growth Of Cowpea:

There was no significant variety effect on the growth of cowpea at 4 WAP. This was because the seedlings had just established and the period was too short for the manifestation of any genetic trait. However, there was significant difference at 6 to 8 WAP with IT89KD-391 having the highest plant height which was not significantly different from IT98K-573-2-1, but differed significantly from UAM 091046-6-2 and UAM 091056-2 (Table 1). The significantly higher plant height of IT89KD-391 may have been due to the genetic capability of the variety to grow taller and spread more than other varieties. The varieties responded significantly different according to their maturity periods (Adeoye et al., 2011).

Effects Of Rate Of Poultry Manure On The Growth Of Cowpea:

The results on plant height from 4 to 8 WAP showed that there was a steady increase in plant height with increasing rate of poultry manure (Table 2). The highest plant height of 55.29 cm was recorded at 8 WAP with an application rate of 6t/ha. At 6 WAP, there was an abrupt decrease in plant height with increasing rate of poultry manure. The reduced plant height may be as a result of environmental factors in the field as reported by Ewulo (2005).

The trend observed with plant height in Table 2 was also observed with number of leaves. This trend shows that with increasing rate of poultry manure, the number of leaves also increased. The presence of higher number of leaves indicates higher rate of photosynthesis per unit time and hence higher yield.

Interaction Effect Of Variety And Rate On The Growth Of Cowpea:

Interaction forms the basis for making valid conclusion and recommendation. The growth habit of any crop specie is the manifestation of its genetic make-up. In Table 3, variety IT89KD- 391 x 0 t/ha interaction produced plants which were taller (96.79 cm) at 8 WAP compared to other variety x rate interactions. While IT98K-573-2-1 x 0 t/ha interaction gave shorter plants (35.59 cm) at 8 WAP. On the basis of growth habit, variety IT89KD-391 could be rated as tall variety, and IT98K-573-2-1 as short or dwarf variety.

Poultry manure is believed to superiorly increase the height of cowpea plants signifying its ability to quickly release nutrient elements required for vigour and growth of the plant, apart from its high nitrogen fixing ability. Similar findings were also reported by Ewulo (2005).

Effects Of Variety On The Yield Of Cowpea:

The higher seed yield of IT98K-573-2-1 (837.40 kg/ha) in Table 4 was probably due to its genetic make-up or constitution, and could be rated as high yielding. This is in agreement with Hanson and Hinson (1962) who observed that genotype has remained an important factor in determining yield responses to plants. All the varieties responded differently in seed yield. Results produced by varieties in Table 4 agrees with Hall et al. (2003) who reported that seed yield in cowpea has a high variation among varieties with a positive correlation at phenotypic levels.

There was no significant difference among the varieties in 100 seed weight. Variety UAM 091046-6-2 had the highest pod length (19.88 cm), number of seeds per plant (167.45), number of pods per plant (19.83) and total dry matter yield (28.70 g). All the varieties responded differently across the various yield parameters of cowpea.

Effects Of Rates Of Poultry Manure On The Yield Of Cowpea:

Table 5 showed that 2 t/ha gave significantly longer pod length (18.02 cm). This may be attributed to the presence of appropriate proportions and quantities of nutrients required for pod development. The application rate of 4 t/ha gave the highest number of seeds per plant (153.03) and this may be attributed to high rates of decomposition of poultry manure, relatively high quality and appropriate quantity of nutrient level it contained compared to other organic manures. Similar findings were also reported by Abebe et al. (2005).

The physiological influence of 4 t/ha was responsible for higher seed yield, 100 seed weight and total dry matter yield of cowpea. The findings in this study suggest that relatively low application rate of poultry manure will give rise to low yield and high application rate will also result to low yields, hence the need to apply average rate of poultry manure. Similar result was also reported by Bakayoko et al. (2012).

Interaction Effect Of Variety And Rate On The Yield Of Cowpea:

In Table 6, IT89KD-391 gave the highest number of pods per plant (22.67) at application rate of 4 t/ha. With reference to seed yield, IT98K-573-2-1 gave the highest seed yield of 888.80 kg/ha when 4 t/ha of poultry manure was applied. Also, UAM 091056-2 produced the highest 100 seed weight (18.60 g) at application rate of 4 t/ha; while UAM 091046-6-2 gave the highest total dry matter yield of 33.50 g when 4 t/ha of poultry manure was applied. This indicates that cowpea varieties performed better when 4t/ha of poultry manure was used. This agrees with the finding of Abebe et al. (2005) who reported that poultry manure applied at the rate of 4 t/ha was comparatively better in contributing to the formation of pods in cowpea, promoting height of cowpea plants, seed yield and might be applicable to other grain legumes.

IV. CONCLUSION

Four varieties of cowpea viz: IT 89kD-391, UAM 091046-6-2, IT98K-573-2-1 and UAM 091056-2 were used for the study. Results clearly showed that rates of poultry manure exerted varied effects on the four varieties of cowpea evaluated. The results obtained indicated that 2 t/ha and 4 t/ha rates of poultry manure gave higher growth and yield of IT98K-573-2-1 and UAM 091056-2 varieties.

There was significant variety x rate interaction on seed yield, 100 seed weight, plant height, pod length, number of pods per plant, number of leaves and number of seeds per plant. This means that rate of poultry manure is an important determinant of growth and yield parameters of cowpea. Variety UAM 091056-2 performed better and was followed by IT98K-573-2-1. Since significant difference was recorded across the varieties and rates of poultry manure, it shows that rates of poultry manure and variety influence maximize yields.

Table 1: Effects of variety on growth parameters of Cowpea

	Plant height (cm)			Number of leaves		
T	Weeks after planting			Weeks after planting		
Variety	4	6	8	4	6	8
IT98K-573-2-1	18.77	63.47	50.87	22.17	55.20	63.90
UAM 091056-2	20.07	41.27	54.87	21.50	35.00	24.60
IT89KD-391	20.52	35.69	63.09	27.67	53.20	80.70
UAM 091046-2	19.61	43.49	44.01	26.67	50.10	67.80
LSD(0.05)	NS	0.15	0.14	NS	NS	14.01

NS = Not significant at 5% probability

Table 2: Effects of Rate of Poultry Manure on Growth Parameters of Cowpea

	PLANT HEIGHT (cm)			Number of leaves		
	Weeks after planting			Weeks after planting		
rate	4	6	8	4	6	8
0 t/ha	22.62	54.56	58.22	22.17	50.80	51.50
2 t/ha	19.79	47.78	50.25	25.67	49.80	53.10
4 t/ha	17.51	41.98	46.21	21.50	42.20	55.20
6 t/ha	19.05	33.49	55.29	28.67	49.90	77.80
LSD(0.05)	1.33	0.15	0.14	5.33	NS	14.01

NS = Not significant at 5% probability

Table 3: Effects of variety x rate interaction on growth parameters of Cowpea

		PLANT HEIGHT (cm)			**Number of leaves**		
		Weeks after planting			Weeks after planting		
variety	**rate**	4	6	8	4	6	8
	(t/ha)						
IT98K-573-2-1	0	16.55	60.11	35.59	18.67	47.30	64.30
	2	22.51	82.33	57.29	26.00	61.00	54.30
	4	16.46	65.19	48.21	23.00	58.00	67.00
	6	19.55	46.24	62.38	21.00	54.30	70.00
UAM 091056-2	0	21.02	38.33	47.39	15.67	28.30	21.30
	2	22.44	29.20	49.19	25.67	40.30	22.00
	4	17.13	58.29	48.16	19.00	38.70	25.00
	6	19.67	39.19	38.73	25.67	32.70	30.00
IT89KD-391	0	29.72	73.19	96.74	28.33	86.00	71.00
	2	17.06	23.22	48.41	24.67	25.00	80.00
	4	18.74	21.50	38.81	22.00	32.30	51.30
	6	16.55	24.89	68.37	35.67	69.30	120.30
UAM 091046-6-2	0	23.19	61.19	38.51	26.00	44.30	46.30
	2	17.14	66.25	36.20	26.33	72.70	56.00
	4	17.69	22.93	49.66	22.00	40.00	77.70
	6	20.42	23.63	51.66	32.33	43.30	91.00
LSD(0.05)		2.65	0.29	0.27	10.65	31.97	28.01

Table 4: Effects of variety on yield parameters of Cowpea

Variety	Pod length (cm)	Number of Pods per plant	Number of seeds per plant	Total dry matter yield (g)	100 seed weight (g)	Seed yield (kg/ha)
IT98K-573-2-1	18.96	18.83	150.09	18.00	16.81	837.40
UAM 091056-2	13.50	13.42	119.82	21.10	16.51	538.80
IT89KD-391	17.67	17.67	154.62	22.90	17.40	611.10
UAM 091046-6-2	19.88	19.83	167.45	28.70	17.64	629.80
LSD(0.05)	0.12	3.02	0.15	6.88	NS	12.57

NS = Not significant at 5% probability

Table 5: Effects of rate of poultry manure on yield parameters of Cowpea

rate (t/ha)	Pod length (cm)	Number of Pods per plant	Number of seeds per plant	Total dry matter yield (g)	100 seed weight (g)	Seed yield (kg/ha)
0	16.59	16.58	153.86	20.30	16.08	621.80
2	18.02	17.83	151.33	22.70	17.32	657.40
4	17.79	17.75	153.03	25.60	18.05	685.90
6	17.60	17.58	133.77	22.10	16.92	652.00
LSD (0.05)	0.12	NS	0.15	NS	0.95	12.57

NS = Not significant at 5% probability

Table 6: Effects of variety x rate interaction on yield parameters of Cowpea

		PLANT HEIGHT (cm)			**Number of leaves**		
		Weeks after planting			Weeks after planting		
variety	**rate** (t/ha)	4	6	8	4	6	8
IT98K-573-2-1	0	20.30	20.33	165.14	14.50	16.13	794.30
	2	20.24	20.00	162.66	18.20	16.97	861.80
	4	18.12	18.00	149.10	20.50	17.77	888.80
	6	17.17	17.00	123.48	18.60	16.37	804.60
UAM 091056-2	0	11.30	11.33	98.63	18.00	14.40	528.10
	2	13.17	13.00	115.48	20.60	15.93	543.90
	4	17.20	17.00	172.50	24.30	18.10	551.50
	6	12.34	12.33	92.67	21.80	17.60	531.50
IT89KD-391	0	13.64	13.67	146.38	23.50	17.07	573.90
	2	17.20	17.00	149.52	22.90	17.77	592.90
	4	17.34	17.33	167.16	24.40	18.10	639.00
	6	22.50	22.67	155.42	20.90	16.67	639.00
UAM 091046-6-2	0	21.10	21.00	205.27	25.40	16.70	46.30
	2	21.47	66.25	36.20	26.33	72.70	56.00
	4	18.54	22.93	49.66	22.00	40.00	77.70
	6	18.40	23.63	51.66	32.33	43.30	91.00
LSD(0.05)		0.24	6.05	0.29	NS	1.89	6.23

NS = Not significant at 5% probability

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