



EFFECT OF SAPROPEL ORGANICS GROW⁺ AND CARBOAMIN⁺ ON TOBACCO GROWTH, YIELD AND QUALITY.

Background:

Grow⁺ and Carboamin⁺ are Sapropel liquid organic fertilisers which contain higher humic acid, carbon and nitrogen in comparison to other organic fertilisers such as vermicompost, manure, and peat. According to the manufacturer, sapropel humic substances are close in structure to natural humic acids from soil and hence are compatible with soil microbes and therefore, can increase soil microbial activity. Grow⁺ and Carboamin⁺ contain 72% humic acids, 65-70% organic matter, 28% fulvic acid, 7-8% Nitrogen, 0.1% P, 12% K, 35% carbon, enzymes, phytohormes, aminoacids, natural chelates, trace elements Zn, B, Mn, Fe, Cu, Mo and are 100% biodegradable. According to the manufacturer Carboamin⁺ can be used as basal fertiliser and Grow⁺ as top-dressing fertilizer and can save 30-50% of synthetic fertiliser required in crop production. The amino acid in the products improves plant growth, seed germination and imparts plant resistance to salinity stress. Both Grow⁺ and Carboamin⁺ can be used in combination with mineral fertilisers, fungicides and insecticides. In an endeavor to reduce Zimbabwe's tobacco production environmental footprint, the Tobacco Research Board has since 1964, been actively involved in the searching for and screening of safer and greener agrochemicals which are compliant with the principles of Good Agricultural Practices. Tests are conducted on new formulations to ensure that the efficacy data is consistent with the registered standard. Therefore, a trial was set up to evaluate such new products as Grow⁺ and Carboamin⁺ on the growth, yield and quality of tobacco.

Aim/ Objective:

To determine the effects of Grow⁺ and Carboamin⁺ on tobacco growth, yield and quality.

Related experiments: None

Design: RCBD 5 treatments replicated 4 times

Treatments:

1. Standard fertilizer (SF) as per soil test
2. 50% SF + Carboamin⁺ applied at 2.5 l/ha (in 250 L of water) planting hole+ Grow⁺ 1 L/ha in 400L of water (3 foliar applications at 3, 5, & 7 WAP)
3. 75%SF + Carboamin⁺ applied 2.5 l/ha (in 250 L of water) planting hole + Grow⁺ 1 L/ha in 400L of water (3 foliar applications 3, 5, & 7 WAP)
4. Carboamin⁺ applied 2.5 l/ha (in 250 L of water) planting hole + Grow⁺ 1 L/ha in 400L of water (3 foliar applications 3, 5, & 7 WAP)
5. No fertiliser applied

SAPROPEL ORGANICS CARBOAMIN+ AND GROW+ TRIAL REPORT:22PH01K

Procedure:

A sample of Grow+ and Carboamin+ send to Analytical Chemistry Services for nutrient analysis before the beginning of the trial. The trial was conducted in the field and treatments were applied as in the treatment table. Standard cultural practices done.

Measurements/observations

- 1 Leaf expansion measurements (at topping and biweekly thereafter)
- 2 Initial, midseason and end of season full soil analysis and microbial counts, salinity and organic matter
- 3 Yield and grade index

Plot size: Planted/treated: 3.6 m x 17.92 m (i.e. 3 row plots)
Harvested/assessed: 1.20 m x 16.80 m (middle row)

Plant spacing: 120 cm x 56 cm

Cultivar: K RK66

Site: Kutsaga

Cultural Practices:

Seedbed sown: 07 July 2021

Clipping: from 26 August 2021

Ploughed and Ridged: 23 September 2021

Planted, nematicide and insecticide herbicide applied: 06 October 2021

Herbicide applied: S-Metolachlor and Sulfentrazone; 12 October 2021

Fertilised: Basal fertiliser 11 October 2021

Top-dressing: 01 November & 21 December 2021

Irrigated: None

Weeding: 01 & 30 November 2021, 25 January & 20 February 2022

RESULTS:

TABLE 1. NUTRIENT STATUS OF SAPROPEL ORGANICS HUMUSON PRODUCTS

PRODUCT		Analysis results as %							OM	C
		N	P	K	Ca	S	B	Zn		
Humuson Grow +	ACS	0.43	0.15	1.49	0.79	1.73	<0.01	<0.02	68.7	39.8
	Manufacturer	5.0	0.1	15	-	-	-	50mg/L		25.0
Humuson Carboamin+	ACS	0.50	0.58	6.02	0.68	1.75	<0.01	<0.02	56.6	32.61
	Manufacturer	8.0	0.1	12	-	0.04	-	30 mg/L	70	35

Nitrogen and Potassium levels were below the levels reported by the manufacturer (5-6.5 and 12%) respectively (Table 1).

TABLE 2: MID SEASON SOIL ANALYSIS (Pending)

TABLE 3. EFFECT OF CARBOAMIN⁺ AND GROW⁺ ON THE SOIL MICROBIAL COUNTS AT THE END OF THE SEASON

TREATMENT	MICROBIAL COUNTS (CFU/G)
Standard fertiliser (SF) as per soil test1	25225.00 a
50% SF + Carboamin ⁺ + Grow ⁺	28500.00 a
75% SF + Carboamin ⁺ + Grow ⁺	25925.00 a
Carboamin ⁺ + Grow ⁺	25500.00 a
No fertiliser applied	24325.00 a
F-probability	0.536
SED	2449.6
LSD	5337.1
CV %	13.4
CV %	

There were no statistical differences in microbial activity at the end of the season ($p > 0.05$, Table 3)

TABLE 4: EFFECT OF CARBOAMIN⁺ AND GROW⁺ ON THE LEAF GEOMEAN OF TOBACCO

TREATMENT	LEAF GEOMEAN		
	12 WAP	14 WAP	16 WAP
Standard fertiliser (SF) as per soil test	36.08 b	44.73 c	45.47 b
50% SF + Carboamin ⁺ + Grow ⁺	32.56 a	42.18 b	42.81 ab
75%SF + Carboamin ⁺ + Grow ⁺	36.62 b	43.07 bc	44.45 b
Carboamin ⁺ + Grow ⁺	32.61 a	38.64 a	39.93 a
No fertiliser applied	32.07 a	39.81 a	40.58 a
F-PROB	0.005	<.001	0.008
S.E.D.	1.21	0.95	1.42
L.S.D.	2.64	2.08	3.09
CV(%)	5.00	3.20	4.70

Leaf expansion as denoted by leaf geomean increased from 12 WAP to 16WAP ranging from 32.07-45.47 (Table 4). There were significant differences among treatments in leaf geomean at 12, 14 and 16 WAP. At 12 WAP the 75% Standard fertiliser supplemented by Carboamin⁺ and Grow⁺ had similar leaf size to the standard fertiliser treatment and this was significantly higher than the other treatments. Similar trend on leaf expansion was obtained at 14 WAP though the 50% Standard fertiliser caught up with the 75% standard fertiliser treatment. At 16 WAP leaf size was similar between the standard fertiliser treatment and the 50% and 75% standard fertiliser complemented with Carboamin⁺ and Grow⁺ and was higher than other treatments. Throughout from 12-16 WAP the no fertiliser treatment and plots where Carboamin⁺ was applied in combination with Grow⁺ only had similar leaf size and was smaller than the standard fertiliser treatment.

TABLE 5: EFFECT OF CARBOAMIN⁺ AND GROW⁺ ON TOBACCO SALEABLE YIELD, (KG/HA)

TREATMENT	SALEABLE YIELD, (KG/HA)			
	REAPING GROUP 1	REAPING GROUP 2	REAPING GROUP 3	ALL GROUPS
Standard fertiliser (SF) as per soil test ¹	342.00 a	777.25	1396.50 b	2515.75
50% SF + Carboamin ⁺ + Grow ⁺	586.75 b	854.50	966.75 a	2408.00
75% SF + Carboamin ⁺ + Grow ⁺	405.00 a	769.75	963.00 a	2137.75
Carboamin ⁺ + Grow ⁺	693.50 c	673.75	706.25 a	2073.50
No fertiliser applied	617.75 bc	756.25	677.75 a	2051.75
F-PROB	<.001	0.858	0.011	0.070
S.E.D.	38.60	160.60	178.70	175.90
L.S.D.	84.10	350.00	389.40	383.20
CV(%)	54.60	29.60	26.80	11.10

While, there were significant differences among treatments in tobacco saleable yield in reaping groups 1 & 3 ($p < 0.05$, Table 5) there were no significant differences in reaping group 2 (Table 5 $p > 0.05$). For reaping group 1 the 75 % standard fertilizer treatment augmented with Carboamin⁺ and Grow⁺ had similar leaf yield to the standard fertilizer treatment and was significantly lower than the other treatments. Carboamin⁺ and Grow⁺ only treatment produced the highest yields in reaping group 1 and these were similar to the no fertilizer treatment. For reaping group 3 the standard fertilizer treatment had the highest tobacco saleable yield and was significantly higher than all treatments. Total saleable yield ranged from 2051.75 - 2515.75 kg/ha. For all reaping groups saleable yield was significantly different among treatments $LSD = 383.20$. The 50% and 75% standard fertilizer treatment augmented with Carboamin⁺ and Grow⁺ had similar saleable yields however the 50% had slightly lower yield than the standard fertilizer treatment

TABLE 6: TABLE 3: EFFECT OF CARBOAMIN⁺ AND GROW⁺ ON TOBACCO GRADE INDEX

Treatment	Group 1	Group 2	Group 3	All Groups
Standard fertilizer (SF) as per soil test	45.10	57.15	51.13	51.75
50% SF + Carboamin ⁺ + Grow ⁺	40.15	51.51	54.89	50.38
75% SF + Carboamin ⁺ + Grow ⁺	44.20	48.28	50.75	48.69
Carboamin ⁺ + Grow ⁺	47.68	51.41	52.81	50.39
No fertiliser applied	45.45	46.08	48.37	45.92
F-probability	0.306	0.105	0.396	0.083
SED	3.35	3.79	3.26	1.94
LSD	7.30	8.25	7.11	4.22
CV %	10.7	10.5	8.9	5.5

There were no significant differences among treatments in leaf quality in reaping 1, 2, 3 and all groups ($p > 0.05$, Table 6).

Discussion

Since there were no significant differences among treatments with respect to microbial activity and grade index the results indicate that the treatments were comparable. However, there were significant differences among treatments with respect to leaf size and saleable yield. Leaf geomean, signifying plant growth and leaf size was significantly lower than the standard fertilizer treatment than in the standalone treatment of Carboamin⁺ and Grow⁺ thus indicating that the treatment does not promote leaf expansion. However, the saleable yield in the treatment where Carboamin⁺ and Grow⁺ as standalone was applied was statistically similar to the standard fertiliser treatment just like the 50 and 75% standard fertiliser augmented with Carboamin⁺ and Grow⁺

Conclusion

The results are not conclusive therefore the trial will be repeated in the next season.