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EFFECT OF BIOGAS MANURE ON TWO *Brassica campestris* L. VARIETIES UNDER SALINE STRESS CONDITION.

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ABSTRACT

Two field experiments were set up at Ras-Sudr Research Station, Desert Research Center, located in South Sinai Governorate, during the two successive seasons, 2001/2002 & 2002/2003, to study the effect of three levels of biogas manure (1.4,2.8,4.2 ton/fed.) compared by recommended level of sheep dung (12.6ton /fed.) on two *Brassica campestris* verities (Bactol & Canola 101) from Agriculture Research Center –Oil Crop Department, and irrigated from two underground water (4238 and 7000 ppm).Results showed that increasing irrigation water salinity from 4238 up to 7000 ppm decreased all the yield and its components of Bactol and Canola 101varieties in both seasons. Bactol variety was superior Canola 101 variety in the yield and its components in both seasons. Increasing organic manure rates from 1.4 ton /fed. Up to 4.2 ton/ fed . increased yield and its components in both seasons. The interaction between irrigation water salinity and two *Brassica* varieties was insignificantly of all yield and its components in two seasons. The interaction between (organic manure x two *Brassica* varieties x and irrigation water salinity) was significantly of some characters yield and its components. The best treatments was Bactol variety fertilized by Sheep dung rate 4.2 ton/fed. and irrigated from well 4500 ppm.

Keywords: Organic manure- Canola 101 -Irrigation water salinity– Bactol variety - Sheep dung

INTRODUCTION

Brassica oil is now the largest source of edible oil following Soybean *(Glycine max* L.) and oil palm (*Elaeis oleifera).*

The process of biogas generation via the anaerobic digestion of organic wastes such as animal wastes, crop residues and weeds saves local fuel for domestic use and maintains the fermented materials as nutritionally rich manure (Sathianathan , 1975).

Plant species as well as varieties differ in their response to salt stress , this phenomenon may be related to variation in gentenic constitution in plant varieties .(Pal *et al* 1984 and El Said and Afiah, 1998). The inhibitory effects of salinity on plant growth are caused by both increasing the soil water potential and accumulation of ions in plant tissues. The aim of this work study the effect of organic manure, two *Brassica* varieties irrigated by two salinity levels .

MATERIAL AND METHODS

Two field experiments were conducted at Ras-Sudr Agricultural Experiment Station of Desert Research Center ,South Sinai Governorate, Egypt during 2001/2002 and 2002 /2003 seasons to study the effect of

three levels of biogas manure compared by recommended level of sheep dung and two varieties (Bactol and canola 101) belonged to *Brassica campestris* L. under two levels of underground water.

Physical and chemical analysis of expermental soil is presented in Table (1a&1b). Each experiment was designed as split split plot with four replicates. Main plot consisted of the two salinity levels (4238 and 7000 ppm) while sub plot were allocated to the two varieties (Bactol and Canola 101)in randomly assigned and manure were arranged in sub sub plot (biogas manure rate 1.4, 2.8, 4.2 ton /fed.these manure were supplied from Biogas Training Center at Moshtohor, Kalyubia Governorate. and sheep dung $30m^3$ /fed. =12.6 ton /fed.

Table (1-a): The physical analysis of Ras-Sudr soil (2001 /2002 and 2002 /2003 seasons:

Seasons	Soil depth (cm)	Sand %	Silt %	Clay %	Soil texture
2001/2002	15 - 30	74 .4	16.9	8.7	Sandy loam
2002/2003	15 -30	76.5	18.5	5.0	Sandy loam

Table (1-b): The chamical analysis of Ras-Sudr soil (2001 /2002 and 2002 /2003 seasons:

Seasons	pH	EC ds/ m	Soluble cations (me /L)				Soluble anions (me /L)			
			Na+	K+	Ca++	Mg++	$CO_3^=$	HCO_3^-	CL^-	$SO_4^=$
2001/2002	7.94	8. 27	18.00	1.60	30.00	22.50	0.00	1.25	60.11	10.74
2002/2003	7.93	9. 29	21.35	1.79	22.63	21.17	0.00	4.80	44.25	17.89

The chemical analysis of two underground water are presented in Table (2). Data in Table (3) and (4) , show the chemical analysis of biogas manure and sheep dung, respectively. The plot area was $6m^2$ containing 4 ridges; eash ridge was of three meter length, 50cm apart and 30cm distance between plants. Seeds were sown on October 17 ,2001 in first season and October 21,2002 in second season.

Table (2) :Chemical analysis of two underground water at Ras -Sudr .

Salinity levels	EC ds/m	TDS p.p.m.	pH	Cations (meq /L)				Anions (meq/L)		
				Ca++	Mg++	Na+	K+	HCO_3^-	CL^-	$SO_4^=$
Well No. 1	6.62	4238	7.29	16.29	22.13	62.00	0.35	1.50	61.89	37.50
Well No . 2	10.94	7000	7.67	16.03	17.27	67.09	0.49	1.40	60.29	38.58

At Ras - Sudr *Brassica* varieties were cultivated a new crop in this area.The normal cultural treatments of growing *Brassica* plants were practiced.

Table (3):Chemical analysis of biogas manure of two growing seasons.

biogas manure Seasons	O.M %	O.C %	T.N %	T. K %	Avail-able K %	T.P %	Avail-able P %	C:N ratio	Soluple NH_4_N p.p.m.	N NO_3 p.p.m
Sample 2001/2002	70.94	41.14	1.26	1.58	1.218	0.50	0.40	32: 1	40	27
Sample 2002/2003	69.10	40.07	1.58	1.74	1.589	0.65	0.41	25: 1	26	24

O.M = Organic Matter . O.C = Organic Carbon . T.N = Total Nitrogen .
T.K =Total potassium . T.P =Total Phosphorous .

Table (4): Constituents of sheep dung manure of two growing seasons

Sample of sheep dung	Moisture content	Organic C%	Total N %	C / N ratio	Organic matter %
2001/ 2002	10.70	21.22	2.10	10.0	36.80
2002/ 2003	10.30	21.60	2.14	10.0	36.84

At harvest time ,ten guarded plants of every plot in four replicates were chosen to determine plant height, 1st bearing branch height, number of branches/plant, number of bearing branches/plant, seed weight /pod, number of seed /pod, 1000 seed weight, but biological yield (ton/fed). and seed yield (ton/ fed.)from the plot (2x 3m).

The data were analyzed statistically as a split split plot a design. The variance for the data was used according to Snedecor and Cochran (1967). Mean comparsion was dune using LSD 5 %.

RESULTS AND DISCUSSION

1-Effect of organic manure:

Data in figures (1a-1e) showed that increasing organic manure rates increased significantly all characters under studied in both seasons. These results are confirmed with (Buren 1979, Patel and Meisheri (1997), they found that plant height, seed yield and yield components for *(Brassica juncea*) increased significantly with formyard manure

2_Effect of two *Brassica* varieties :

Data presented in figures (2a-2e)showed that Bactol variety was superior significantly than Canola 101 variety in all characters under studied in both seasons. These results are confirmed by the recommended variety in Arab Rebublic of Egypt (A.R. E.)

3-Effect of irrigation water salinity :

Data in figures (3a-3e) showed that increasing irrigation water salinity from 4238 ppm up to 7000 ppm decreased significantly all characters under study except plant height in first seasons and seed weight per pod in both seasons .These may be due to the effects of salinity should be much more closely associated with metabolic/nutritional changes within the growing tissues of leaves than in whole or nongrowing leaf tissues .

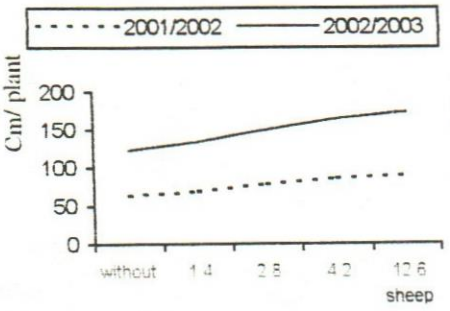

Fig. (1a) : Effect of organic manure on plant height in first and second season

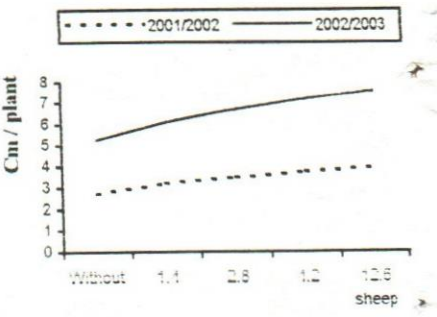

Fig.(1b) : Effect of organic manure on 1st bearing branch height cm in first and second season

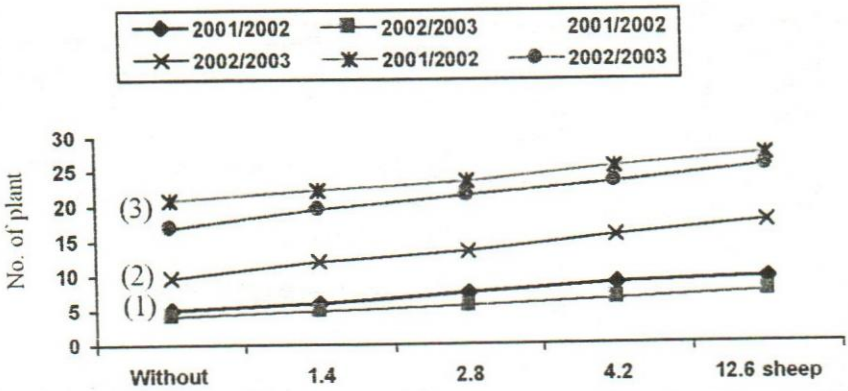

Fig.(1c): Effect of organic manure on (1)Number of branches /plant. (2) Number of bearing branches /plant and (3) Number of seed/pod in first and second season

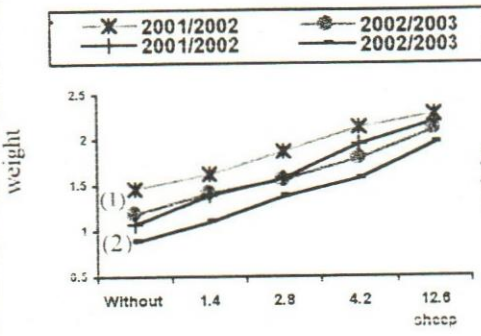

Fig. (1d) : Effect of organic manure on (1)1000- seed weight gm and (2) seed yield ton/fed. in first and second season

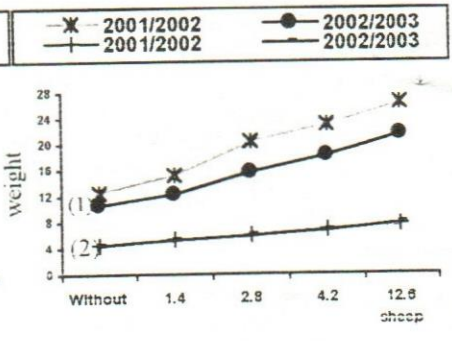

Fig.(1e): Effect of organic manure on (1) Biological yield ton/fed and (2) seed weight/ pod in first and second season

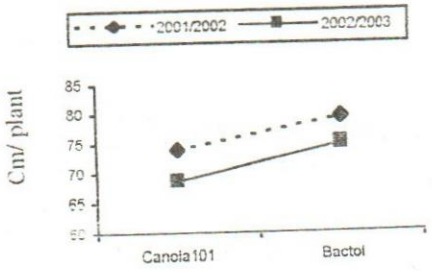

Fig. (2a) : Effect of *Brassica* verieties on plant height in first and second season

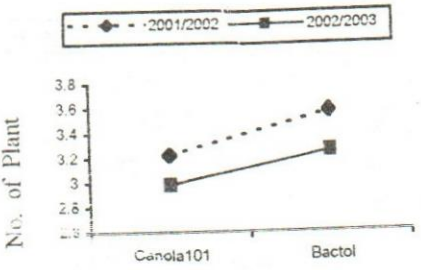

Fig. (2b) : Effect of *Brassica* verieties on 1st beuring branch height cm in first and second season

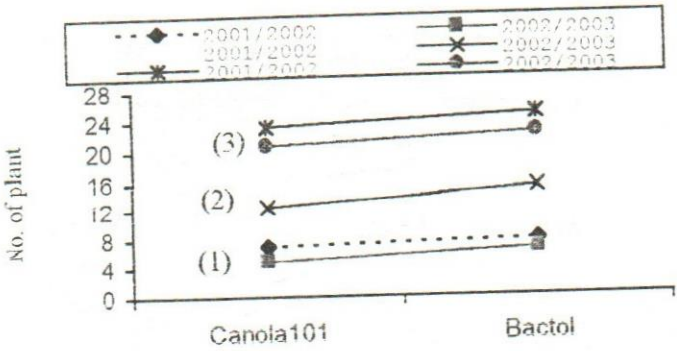

Fig. (2c) : Effect of *Brassica* verieties on (1) Number of branches /plant. (2) Number of beuring branches/plant and (3) Number of seed/pod in first and second seaso

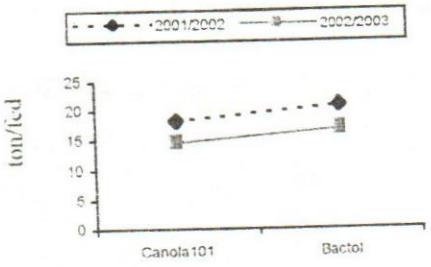

Fig. (2d) : Effect of *Brassica* verieties on Biological vield ton/fed in first and second seaso

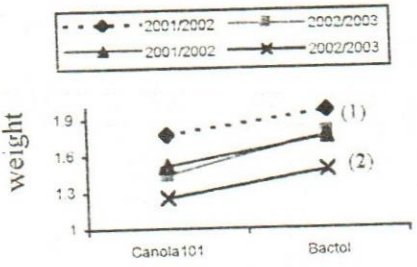

Fig. (2e) Effect of *Brassica* verieties on (1) 1000- seed weight gm and (2) seed yield ton/fed. in first and second season

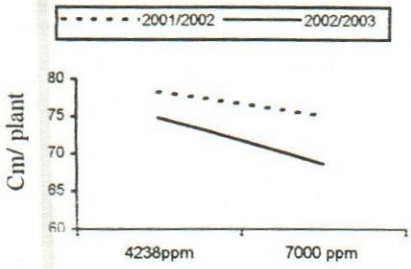

Fig. (3a) : Effect of irrigation water salinity on plant height in first and second season

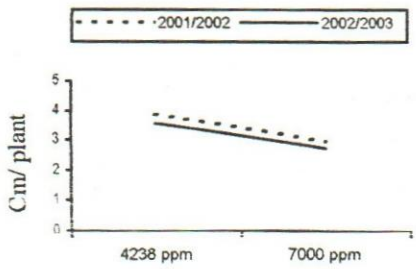

Fig. (3b) : Effect of irrigation water salinity on 1st bearing branch height cm in first and second season

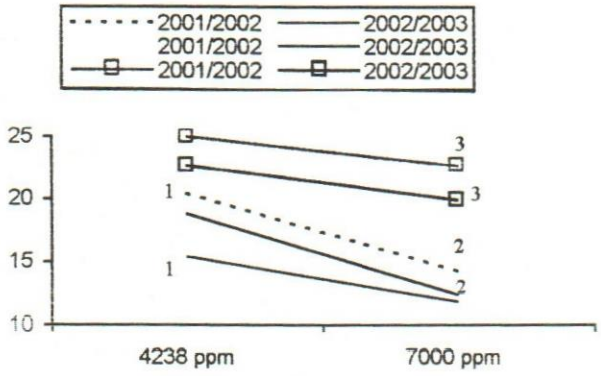

Fig. (3c) : Effect of irrigation water salinity on (1) Number of bearing branches/ plant. (2) Biological yield ton/fed and (3) Number of seed/pod in first and second season

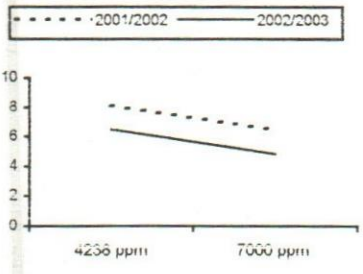

Fig. (3d) : Effect of irrigation water salinity on Number of branches /plant in first and second season

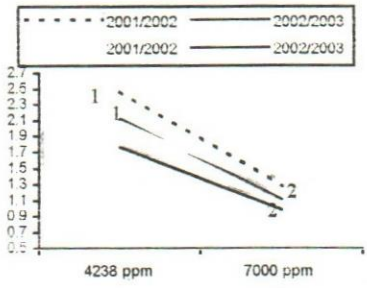

Fig. (3e) : Effect of irrigation water salinity on (1) 1000- seed weight gm and (2) Seed yield ton/ fed. in first and second season

The obivious results are agree with Rupas ,*et al* (1987), Thakral ,*et al* (1996) and Leland, (1994). They found that seed yield, plant height, number of branches per plant,1000 seed weight decreased under the influence of salinity .

4-Effect of interactions :

4-a:The interaction between organic manure and *Brassica* varieties :

Data in Table (5 a &5 b) showed that the interaction between organic manure and *Brassica* varieties were significantly in all characters under studied except number of bearing branches per plant ,seed weight per pod and 1000_seed weight per gram in 2001/2002 season and seed weight per pod and 1000-seed weight per gram in 2002 /2003 season, were insignificantly. The best treatment was Bactol variety and fertilized by sheep dung in both seasons .

Table (5-a) :Effect of the interaction between organic manure and two *Brassica* varieties during 2001/2002 .

Treatments	Plant height cm/plant	1st bearing branch height	Number of branches /plant	Biological yield ton/fed.	Number of seed/ pod	Seed yield ton/fed.
Canola 101, without	60.25	2.65	4.5	11.15	20.00	0.963
1.4 ton/fed. Biogas	67.00	3.05	5.0	13.41	21.25	1.253
2.8 ton/fed.biogas	73.25	3.375	7.0	19.23	22.25	1.415
4.2 ton/fed.biogas	81.75	3.55	8.5	21.58	25.25	1.875
Sheep dung 12.6 ton /fed.	87.50	3.775	9.5	25.47	26.25	2.051
Bactol, without	65.75	3.075	5.5	13.69	21.50	1.155
1.4ton/fed.biogas	70.00	3.325	6.75	16.81	23.00	1.503
2.8 ton/fed.biogas	82.25	3.55	7.75	21.48	24.50	1.71
4.2 ton/fed.biogas	88.25	3.875	9.00	24.42	25.75	2.018
Sheep dung 12.6 ton/fed.	90.25	4.025	9.25	27.235	28.25	2.343
LSD	1.6336	0.1937	0.6491	0.3188	0.9773	0.03712

Table (5-b) :Effect of the interaction between organic manure and two *Brassica* varieties during 2002/2003

Treatment	Plant height	1st bearing branch height	Number of branches /plant	Number of bearing branches/plant	Biological yield ton/fed.	Number of seed /pod	Seed yield ton/fed.
Canola101 without	57.65	2.20	3.65	8.60	8.81	17.00	0.743
1.4ton/fed.biogas	62.75	2.75	4.15	10.45	10.85	18.00	0.998
2.8ton/fed.biogas	67.85	3.10	4.60	11.55	14.26	20.40	1.233
4.2ton/fed. biogas	75.15	3.35	5.20	14.20	17.55	22.35	1.415
Sheep dung 12.6 ton /fed.	79.40	3.50	6.60	16.75	20.90	25.55	1.883
Bactol without	61.15	2.80	4.55	10.60	12.10	18.55	1.00
1.4ton/fed. biogas	67.80	3.00	5.45	13.40	13.40	20.85	1.173
2.8ton/fed.biogas	75.45	3.25	6.40	15.20	16.90	22.40	1.493
4.2ton/fed. biogas	82.30	3.50	7.55	16.90	18.95	24.05	1.705
Sheep dung 12.6 ton/ fed.	87.25	3.70	8.05	18.20	22.00	26.40	2.025
LSD	0.2370	0.2146	0.2223	0.23702	0.2625	0.2703	0.00603

4-b:The interaction between organic manure and irrigation water salinity

Data in Table (6 a &6 b) showed that the interaction between organic manure and irrigation water salinity were significantly in all characters under studied in the second season except 1000-seed weight in the first season .The best treatment in all characters under studied was the irrigated by 4238 pp m and fertilized by sheep dung in both seasons .

Table (6-a) :Effect of the interaction between organic manure and irrigation water salinity during 2001/2002 .

Treatment	Plant height	1st beari.	No .of branc	No.of beari. branches	Biol. yield	No. of seed /pod	Seed weight/pod	Seed yield ton/fed
7000 ppm without	62.75	2.70	4.50	10.75	9.793	19.75	0.0395	0.661
1.4ton/fed. Biogas	67.25	2.80	5.50	13.00	11.76	21.25	0.046	1.005
2.8ton/fed. Biogas	75.00	2.90	6.00	14.25	15.93	22.75	0.052	1.195
4.2ton/fed. Biogas	83.25	3.125	7.25	15.75	17.40	24.00	0.059	1.429
Sheep dung 12.6 ton/f	86.75	3.425	8.50	17.50	20.67	25.50	0.067	1.641
4238 ppm without	63.25	3.025	5.50	13.25	15.05	21.75	0.048	1.458
1.4ton/f. biogas	69.75	3.575	6.25	18.00	18.45	23.00	0.059	1.750
2.8ton/fed. biogas	80.50	4.00	8.75	20.25	24.78	24.00	0.064	1.930
4.2 ton/fed. biogas	86.75	4.30	9.75	23.25	28.60	27.00	0.074	2.468
Sheep dung 12.6 ton/fed.	91.00	4.375	10.25	27.25	32.04	29.00	0.082	2.753
LSD	1.6336	0.1937	0.649	1.4991	0.319	0.9773	0.0031	0.0371

Table (6-b):Effect of the interaction between organic manure and irrigation water salinity during 2002/2003.

Treatment	Plant height	1st bearing branch height	Number of branches /plant	Number of bearing branches/plant	Biological yield ton/fed.	Number of seed /pod	Seed weight/pod	1000_seed weight	Seed yield ton/fed
7000ppm without	57.6	2.25	3.55	9.00	8.36	16.9	0.04	0.78	0.56
1.4ton/fed. Biogas	62.75	2.50	4.00	10.35	9.35	18.25	0.048	0.93	0.71
2.8ton/fed. Biogas	69.50	2.80	4.65	11.60	11.91	20.3	0.051	1.06	0.99
4.2ton/fed. Biogas	74.35	2.90	5.40	13.35	14.95	22.10	0.059	1.24	1.19
Sheep dung 12.6 ton/fed.	78.75	3.10	6.45	14.75	17.40	23.80	0.068	1.51	1.44
4238ppm without	61.20	2.75	4.65	10.20	12.55	18.65	0.0445	1.58	1.19
1.4ton/f. biogas	67.8	3.25	5.60	13.50	14.90	20.60	0.053	1.89	1.46
2.8ton/fed. Biogas	73.6	3.55	6.35	15.15	19.25	22.50	0.063	2.035	1.74
4.2ton/fed. Biogas	83.10	3.95	7.35	17.75	21.55	24.30	0.072	2.34	1.93
Sheep dung 12.6 ton/fed.	87.90	4.10	8.20	20.20	25.50	27.15	0.081	2.72	2.47
LSD	0.0237	0.2146	0.2223	0.2370	0.2625	0.2703	0.00335	0.1002	0.00603

4-c:The interaction between irrigation water salinity and *Brassica* varieties :

The interaction between irrigation water salinity and *Brassica* varieti were insignificantly in all characters studied in both seasons .

4-d:The interaction between organic manure *Brassica* varieties and irrigation water salinity :

Data in Table (7 a&7 b) repoted that the interaction between organic manure, *Brassica* varieties and irrigation water salinity was significantly in all characters under studied except the 1st bearing branch height, number of bearing branches per plant and seed weight per pod in the first season ,and 1st bearing branch height ,number of branches per plant and seed weight per pod in the second season .

Table (7-a) :Effect of the interaction between organic manure two varieties and irrigation water salinity during 2001/2002 season .

Salinity	Varieties	*Organic manure*	Plant height /plant	No.of branches/plant	Biological yield t./f.	No.of seed /pod	1000_seed weight/g	Seed yield ton/fed.
7000 ppm	C101	without	59.5	4.0	8.86	19.0	0.870	0.586
		1.4 ton/fed biogas	66.0	4.5	10.10	20.5	0.950	0.845
		2.8 ton /fed biogas	72.0	5.0	15.24	22.0	1.03	1.010
		4.2 ton/fed. biogas	81.0	7.5	16.66	24.0	1.370	1.333
		Sheep dung 12.6 ton ./fed.	84.5	9.0	20.38	24.5	1.530	1.451
	Bactol	without	66.0	5.0	10.73	20.5	0.920	0.735
		1.4 ton/fed biogas	68.5	6.5	13.42	22.0	1.150	1.165
		2.8 ton /fed biogas	78.0	7.0	16.64	23.5	1.455	1.380
		4.2 ton/fed. biogas	85.5	8.0	18.14	24.0	1.655	1.525
		Sheep dung 12.6 ton ./fed.	89.0	8.0	20.95	26.5	1.750	1.830
4238 ppm	C101	without	61.0	5.0	13.44	21.0	1.900	1.340
		1.4 ton/fed biogas	68.0	5.5	16.71	22.0	2.155	1.660
		2.8 ton /fed biogas	74.5	9.0	23.22	22.5	2.455	1.820
		4.2 ton/fed. biogas	82.5	9.5	26.50	26.5	2.660	2.425
		Sheep dung 12.6 ton ./fed.	90.5	10.0	30.56	28.0	2.785	2.650
	Bactol	without	65.5	6.0	16.65	22.5	2.120	1.575
		1.4 ton/fed biogas	71.5	7.0	20.19	24.0	2.190	1.840
		2.8 ton /fed biogas	86.5	8.5	26.33	25.5	2.520	2.04
		4.2 ton/fed. biogas	91.0	10.0	30.70	27.5	2.850	2.510
		Sheep dung 12.6 ton ./fed.	91.5	10.5	33.52	30.0	3.055	2.855
LSD			2.3102	0.9179	0.4509	1.382	0.2369	0.0166

In all signficant treatment, the best treatment was the Bactol variety, fertilized by sheep dung and irrigated by 4238 ppm.

Table (7-b) :Effect of the interaction between organic manure two varieties and irrigation water salinity during 2002/2003 season .

Salinity	Varieties	Organic manure	Plant height /plant	No.of branches/plant	Biological yield t./f.	No.of seed /pod	1000_seed weight/g	Seed yield ton/fed.
7000 ppm	C101	without	55.0	8.0	7.12	16.5	0.72	0.48
		1.4 ton/fed biogas	60.2	9.4	8.10	17.0	0.88	0.66
		2.8 ton /fed biogas	65.5	10.1	10.22	19.3	0.95	0.81
		4.2 ton/fed. biogas	70.3	11.3	13.60	21.2	1.03	1.01
		Sheep dung 12.6 ton ./fed.	73.5	13.2	16.30	22.8	1.37	1.34
	Bactol	without	60.2	10.0	9.60	17.3	0.83	0.64
		1.4 ton/fed biogas	65.3	11.5	13.60	19.5	0.97	0.77
		2.8 ton /fed biogas	73.5	13.1	13.60	21.3	1.17	1.17
		4.2 ton/fed. biogas	78.4	15.4	16.30	23.0	1.45	1.37
		Sheep dung 12.6 ton ./fed.	84.0	16.3	18.50	24.8	1.64	1.53
4238 ppm	C101	without	60.3	9.2	10.50	17.5	1.24	1.01
		1.4 ton/fed biogas	65.3	11.5	13.60	19.0	1.65	1.34
		2.8 ton /fed biogas	70.2	13.0	18.30	21.5	1.85	1.66
		4.2 ton/fed. biogas	80.0	17.1	21.50	23.5	2.16	1.82
		Sheep dung 12.6 ton ./fed.	85.3	20.3	25.50	26.3	2.54	2.43
	Bactol	without	62.1	11.2	14.60	19.8	1.92	1.36
		1.4 ton/fed biogas	70.3	15.5	16.20	22.2	2.12	1.58
		2.8 ton /fed biogas	77.4	17.3	20.20	23.5	2.22	1.82
		4.2 ton/fed. biogas	86.2	18.4	21.60	25.1	2.52	2.04
		Sheep dung 12.6 ton ./fed.	90.5	20.1	25.50	28.0	2.90	2.52
LSD			0.3352	0.3345	0.3712	0.382	0.1417	0.0086

From obivous results the best variety was Bactol fertilized by sheep dung, the net return of it was 633 and 556.2LE/fed. In the first and second season respectively, but biogas manure (gas as a primary product used in cooking and lighting and secondary product as a manure ,farmers used it as an economically organic manure because it was safely to protect against pollution and saving money under saline stress conditions) increasing. from control to 4.2 ton/fed.inceased net return 1016.6 and 736.6 LE /fed. in first and second season. -2003 season. (Sheep dung price= 30LE/m3, Biogas manure price = 40LE/m3, Brassica seed price=1400LE/ton.)

5- Costs and benefits of fertil- izer use:

Date in table (8), illustrate that in creasing Lrogasmanure from control to 4.2 ton/fed.inceased net return by /016.6 and 736.6 LE /fad.in first and second season respectively. On the others hand .net return of sheep duny were 633 , and 556.2 LE / fed in 2001- 2002 season and 2002-2003 season .from obivious results the net return from 4.2 ton / fed was high compared by sheep dung by 383.6 and 180.4 LE /fed ., for the first and second season respectively .from date in Table (8) .the biogas manure treatments can used economcally under saline stress conditsus .

Table (8) Costs benefils analysis of organic fertilizer use in two growing seasons during 2001/20002 and 2002/2003.

Treatments of manure / Costs /Fed./LE	Control without manure	1.4 ton/fed Biogas manure	2.8 ton/fed Biogas manure	4.2ton/fed Biogas manure	Sheep dung
Preparing and Ploughing/LE	45	45	45	45	45
Seeds 5kg1fed. (Kg/10LE)	50	50	50	50	50
Labour 4/fed.15LE	60	60	60	60	60
Mineral Fertilizer	200	200	200	200	200
Organie Fertilizer	----	56	112	168	900
Labour 4/fed.15 LE	----	60	60	60	60
Hoeling and thinning	100	100	100	100	100
Labour 5/fed 15 LE	75	75	75	75	75
Harvesting and Traneporting	150	150	150	150	150
Total of Costs fed./LE	680	796	852	908	1640
Seed yield (ton fed) 2001/2002	1.059	1.377	1.561	1.948	2.197
Seed yield return Ret	1482.6	1927.8	2185.4	2727.2	3075.6
Seed yield(ton fed) 2002/2003	0.871	1.085	1.363	1.560	1.954
Gross Return	1219.4	1519.0	1908.2	2184.0	2735.6
Net return 2001/2002 (LE/Fed)	802.6	1131.8	1333.4	1819.2	1435.6
Net return 2002/2003 (LE/Fed)	539.4	723	1056.2	1276	1095.6

Sheep dung price = 30 LE/m3 , Biogas manure price = 40 LE/ton whereas canola seed price = 1400 LE/ton.

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تأثير سماد البيوجاز على صنفين من الكانولا تحت ظروف الإجهاد الملحي

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تم إجراء تجربتين حقليتين بمحطة مركز بحوث الصحراء براس سدر بمحافظة جنوب سيناء خلال الموسمين الزراعيين ٢٠٠١/ ٢٠٠٢ و٢٠٠٢/٢٠٠٣ وذلك لدراسة تأثير بعض الأسمدة العضوية كسماد البيوجاز (١,٤ –٢,٨–٤,٢طن /فدان) وسماد مخلفات الأغنام بمعدل ١٢,٦طن /فدان (٣٠م٣ /ف)المعتاد استخدامة بالمنطقة والموصى به من قبل الإرشاد الخاص بمنطقة جنوب سيناء –وذلك لما يتميز به سماد البيوجاز بأنة آمن للحماية من التلوث ورخص ثمنه بالنسبة لسماد مخلفات الأغنام –على صنفين من الكانولا (ألبا كتول –كانولا ١٠١)والتي تم ريهم من بئران عن طريق شبكة ري مجهزة بالمحطة ملوحتهما(٤٢٣٨ و٧٠٠٠ جزء في المليون).

وقد أوضحت النتائج المتحصل عليها الأتي :

١– بزيادة مستويات ملوحة ماء الري من ٤٢٣٨ حتى ٧٠٠٠ جزء في المليون تقل صفات المحصول ومكوناته لكلا الصنفين في كلا الموسمين .

٢– تفوق صنف ألبا كتول على صنف كانولا ١٠١ في صفات المحصول ومكوناته في كلا الموسمين .

٣– يزداد المحصول ومكوناته بزيادة معدلات سماد البيوجاز من ١,٤طن /فدان وحتى ٤,٢ طن/فدان في كلا الموسمين.

٤– كان التفاعل بين ملوحة ماء الري والأصناف غير معنويا للمحصول ومكوناته في كلا الموسمين .

٥– كان التفاعل بين كل من (سماد البيوجاز ×الأصناف ×ملوحة ماء الري)معنويا في بعض صفات المحصول ومكوناته حيث كانت افضل معاملة هي المسمدة بالمعدل المرتفع من سماد الأغنام وصنف ألبا كتول والتي تروى ٤٢٣٨ جزء في المليون وكان هذا في كلا الموسمين .

٦– استخدام سماد البيوجاز بمعدل ٢ر٤ طن / فدان أدى إلى زيادة صافى دخل محصول الكانولا بالمقارنة استخدام سماد الأغنام وذلك تحت الظروف الملحية .