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Influence of Rice Straw and Bio-organic Fertilizers on Cotton Fiber Quality under Saline Soils

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Abstract: Field experiment was conducted at South El- Hossinia Res. Station, El-Sharkia Governorate, Agric. Res. Center (ARC), Egypt, during 2011-2012 seasons. To study the effect of adding rice straw as an organic waste to saline soil with the inoculation of some bacterial strains as biofertilizer (PGPR) and tea compost both separately or together with or without rice straw on cotton fiber quality compared to the control. As well as, study the impact of these transactions on some soil chemical and biological properties. The experiment was laid out in a split plot design with four replicates. The rice straw (R) application was taken the main plot as a main factor with two methods (with rice straw, without rice straw), whereas; the others fertilizers Treatments (T) were distributed randomly in the sub plots. Results revealed that, treating saline soil by rice straw achieved the highest content of soil organic matter, fiber upper half mean, fiber uniformity index, fiber strength, fiber elongation percentage, micronaire value, fiber maturity ratio and fiber reflected percent. In contrast, the fiber yellowness degree (b+)decreased, compared with the soil untreated with rice straw. All transactions applied with tea compost in addition to PGPR led to significant decrease on pH and EC levels of the soil compared with other treatments during the period of the two seasons. Transactions with added bacterial strains led to increase the nitrogen, phosphorus and potassium elements to be soft soil compared with the rest of the transactions, as well as, the control treatment. Bacterial strains transactions led to increase soil biological activity compared with the rest of the transactions, as well as the control treatment. Spraying the mix of bacterial (PGPR) and tea compost in the presence of rice straw resulted in significant increase cotton fiber upper half mean, fiber reflected percent, fiber strength, Micronaire value and fiber maturity ratio. On the contrary, they had no significant effect on, fiber elongation percentage, uniformity index and yellowness degree, in comparison with the rest of the transactions, as well as the control treatment.

Key words: Saline, soil, rice straw, cotton, tea compost, PGPR, bio, fertilizer, organic

INTRODUCTION

Cotton was the tendon of the Egyptian economy in the last decades, but now it faces the problem of the competition with the other field crops. So, efforts should be integrated in all fields to return cotton to its position and go out from the narrow valley to other types of soils this need applying with special field treatments fit to the soil type and increase the quality and the quantity of the cotton. Heba (1999), Laxminarayana and Patirani (2005) and Tchiadje (2007) reported that using techniques involving both traditional as well as recent scientific applications, help to increasing the crop yield and quality, saving the environment and protecting human health by reducing the polluted chemicals and applying the suitable field practices to such soil type. Salinity is one of the most important biotic environmental stresses to crop production. Although, cotton is classified as a salt tolerant crop, so, we should exploit cotton in the Egyptian saline soils (Ashraf, 2002; Grewal, 2010) stated that cotton often adversely affected by soil salinity mainly during emergence and seedling growth. Also, Zhu (2001) reported that different plant growth and development processes i.e., germination, flowering and fruiting are adversely affected by salinity, resulting in reduced yield and quality therefore, soil salinity is becoming a dangerous risk to agricultural productivity about 20% of the world's cultivated area and nearly half of the world's

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irrigated lands are affected by salinity. This may be due to the facts explained by Cha-um *et al.* (2006), Jampeetong and Brix (2009), Gorai *et al.* (2010), Keshavarz *et al.* (2004) they found that high concentrations of Na^+ and Cl^- ions usually slow down the cotton plant nutrition. Therefore, soil test analysis for nutrient availability and suggested fertilizer levels may be differ according to the degree of salinity. However, Rajguru *et al.* (1999) reported that during stress conditions, the production of reactive oxygen species increase because the normal levels of antioxidant enzymes are not adequate to prevent the damaging effects of the free radicals. Cell damage and a reduction in growth rate result. Thus some helpful field treatments could be helpful like mulching with crop residue, such as straw, reduces evaporation from the soil surface which in turn reduces the upward movement of salts. Reduced evaporation also reduces the need to irrigate. Consequently fewer salts accumulate. Incorporation of organic matter, Incorporating crop residues or green-manure crops improves soil structure and improves water infiltration which decreases the bad effects of salinity. In order for this to be effective, regular additions of organic matter (crop residue, manure, sludge and compost) must be made. Compost and rice straw on some soil microorganisms strains. Badran *et al.* (2000) and El-Hady *et al.* (2011) found that, micro-organisms such as bacteria, fungi are improved the physical, chemical and biological properties of soils. The impact effect of such organisms include the modification and decomposition of plant residues and other organic materials and the formation of compost which considered the most active material affects the soil. One result of these processes of decay is to release, nutrients, such as nitrogen, phosphorus and sulfur from available organic forms, to be able to use by plant. All this previous results help as to perform the goal of our investigation which is decreasing the bad effect of saline soils on plant and soil microbial activates. Also, studying the influence of rice straw and bio-organic fertilizers on fiber quality under saline soils.

MATERIALS AND METHODS

Field Experiment was conducted to examine the influence of rice straw, bioinoculants, tea compost and their combinations on fiber quality of the Egyptian promising hydride 10229x86 (because it is the nearest genotype to the variety used in this location G 86) at South El-Hossinia Res. farm Station, El-Sharkia Governorate, Agric. Res. Center (ARC), Egypt, during 2011 and 2012 growing seasons. The experiment was laid out in a split plot design with four replicates. The rice straw (R) application was occupied the main plot as a main factor with two levels(with rice straw, without rice straw), while; the others fertilizers treatments (T) were distributed randomly in the sub plots .net plot size was 4×3.6 m with proper irrigation channels. Means were compared using LSD at 0.05 level of significant method and multiple range tests according to Snedecor and Cochran (1986).

The following the fertilizer treatments were used in this study:

Main factors (rice straw (R)):

- Without rice straw (r1)
- With rice straw (r2)

Sub main factors(fertilizer treatments T):

- 100% mineral fertilizer (recommended dose 60 kg N/feddan, 30 kg K/feddan, 15 kg P_2O_5/feddan)…….control 1..... (T1)
- 50%ofrecommended……..control2.....(T2)
- T2+PGPR…….....……. (T3)
- T2+tea compost…… ….....(T4)
- T2+PGPR+tea compost…….....(T5)

Soil analysis: The experimental field soil was sampled initially before conducting the experiment to determine its physical and chemical analyses according to Jackson (1976) .The results of these analyses are shown in Table 1.

Mineral fertilizers: Ammonium nitrate 33.5%, super phosphate 15% as P_2O_5 and potassium sulphate as K_2O were obtained from the chemical Store of soils, Water and Environment Research Institute, ARC. The mineral fertilizers were added as recommended dose for the control treatment and as half recommended dose for the rest treatments.

Rice straw: Rice straw was collected from South El- Hossinia Res. farm Station, El-Sharkia Governorate. It was an aerobically dried. Rice straw was ploughed into soil before cultivating the cotton. The ratio of rice straw addition was 2500 kg/Fedayeen. results of shown Table 2.

Extraction of tea compost: Compost extract was prepared from compost mad from rice straw and cattle dunk. Which had been composted in aerobic heap for three months to prepare enriched Quantity of 10 kg of mature compost

Table 1: Physio-chemical properties of the experimental soil

Properties	2011	2012	Properties	2011	2012
Particle size distillation (%)	4.9	3.9	**Cations meq L^{-1}**		
Coarse sand	25.6	24.1	Ca++	7.04	7.02
Fine sand	52.5	51.88	Mg++	4.89	7.88
Silt	19.25	19.9	Na+	10.49	10.37
Clay	Sandy clay	Sandy clay	K+	0.45	0.43
Texture clay	loam	Loam	**Anions meq L^{-1}**		
$CaCO_3$	1.41	1.35	CO_3^{2-1}	0	0
pH(1:2:5)soil solution	8.23	7.87	HCO_3^{-1}	9.53	8.92
EC ds m^{-1} (soil paste)	2.23	2.18	Cl^{-1}	9.16	9.04
Total N %	0.2	0.23	SO_4^{-1}	11.3	11.31
Organic C %	0.86	0.88			

Table 2: Analysis of the rice straw

		O.M	O.C	C/N	T.N	T.P	T.K	Zn	Mn	Fe	Cu	Ash
pH (1:5)	Ec (1:10)	----------(%)----------						----------(ppm)----------				
6.84	5.12	0.18	46.50	95:1	0.49	0.52	0.77	220	75	722	61	19.82

Table 3: Nutrient contents of compost tea

Contents	values
pH (1:10)	8.04
Ammonical nitrogen(ppm)	20
Nitrate nitrogen (ppm)	35
Total nitrogen (ppm)	120
COD (mg L^{-1})	980
BOD (mg L^{-1})	435
Total Phosphorous (ppm)	60
Total Potassium (ppm)	50

was immersed in appropriate volume of water for 7 days to produce extracts. This extract mixed with PGPR into ratios 1:1 to produce bio-extracted shown Table 3.

PGPR: PGPR is a bacteria strains, Pseudomonas putida, Bacillus megatherium, Azospirillum brasilense. It was obtained from culture collection of Agric. Microbiology Dept., NRC, Giza, Egypt. PGPR concentration was adjusted to 1×10^8 (CFU g^{-1}) in all inoculants and sprayed as the recommended times for cotton plant.

Fiber properties: Micronaire value, fiber maturity ratio (MR), upper half mean (UHM)millimeter, fiber uniformity index (UI), fiber reflected percent or brightness (Rd)%, yellowness degree (+b)%, fiber strength (gram/tex) and fiber elongation percentage were determined using HVI instrument system according to (ASTM D4605-86, 1986). All properties were measured under standard conditions of (65±5%) relative humidity and (20±2°C) room temp.

RESULTS AND DISSCUTION

Soil chemical properties: Data in Table 4 showed some chemical properties of the saline soil after cotton harvesting as affected by different applied treatments in 2011 and 2012. Results in Table 4 showed the changes occurring in some chemical properties of the saline soil used as affected by PGPR and tea compost as foliar spraying separately or together with or without plowing rice straw.

As to, Soil organic matter after cotton harvesting as affect by the tested PGPR and/or tea compost treatments with or without rice straw is shown in Table 4 Results revealed that only the incorporation either with or without increased the soil organic matter throughout Planting period, then decrease after the harvest. Treatments with rice straw achieved high result after two season recorded 14.11 and 14.82% this may be content PGPR and tea compost which contribute in stimulate activity of microorganisms. It was worthy to mention r2 T5 gave high result than r1T5 because its contents rice straw with PGPR and tea compost. so treatments with rice straw tended to achieve relatively higher values of total-N, available N,P and K , as well as enhanced the organic-C in saline soil, compared to the treatment without rice straw or control. However, there was a very slight effect in organic carbon% and pH value. More flourishing in chemical and biological properties of the salinity soil was attained due to the foliar application of the enriched PGPR and tea compost with rice straw. The pH value of the salinity soil was very slightly affected by any of any of the treatment without rice straw, while diminution of the pH value was much pronounced of the enriched PGPR and tea compost with rice straw these results are in agreement with those obtained by Laxminarayana and Patiram (2005) Results of organic-c , total-N given in Table 4 revealed that addition of rice straw led to relative increase in such chemical parameters as compared with absolute control . Moreover, rice straw, PGPR and tea compost attained the highest values of total-N, in addition application of the enriched PGPR and tea compost to the same preceded treatments exhibited more advancement in the obtained values. The

Table 4: Influence of rice straw and bio-organic fertilizers on soil chemical properties under saline soils in 2011 and 2012

		OM%			E.C (dS m^{-1})			pH			Total N, P and K%								
											N			P			K		
Treatments		2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.
r1T1		8.60	8.71	8.65	2.180	2.160	2.170	7.93	7.91	7.92	0.190	0.210	0.200	0.470	0.480	0.480	0.450	0.430	0.440
r1T2		8.11	7.50	7.80	2.220	2.190	2.210	7.98	7.98	7.98	0.170	0.180	0.180	0.450	0.450	0.450	0.420	0.390	0.410
r1T3		9.36	9.65	9.51	2.110	2.110	2.110	7.72	7.69	7.71	0.240	0.250	0.250	0.530	0.550	0.540	0.540	0.540	0.540
r1T4		9.88	10.20	10.00	2.090	2.070	2.080	7.78	7.75	7.77	0.220	0.230	0.230	0.500	0.510	0.510	0.500	0.510	0.510
r1T5		10.36	10.70	10.60	2.100	2.110	2.110	7.68	7.65	7.67	0.250	0.260	0.260	0.550	0.540	0.550	0.560	0.580	0.570
r1Mean		9.26	9.36	9.31	2.140	2.130	2.130	7.82	7.80	7.81	0.210	0.220	0.220	0.500	0.510	0.500	0.490	0.490	0.490
r2T1		10.08	10.10	10.20	1.990	1.790	1.890	7.12	7.07	7.10	0.200	0.220	0.210	0.680	0.690	0.690	0.650	0.660	0.660
r2T2		9.01	8.79	8.90	2.110	2.000	2.060	7.48	7.18	7.33	0.190	0.210	0.200	0.630	0.670	0.650	0.600	0.600	0.600
r2T3		11.79	11.90	11.90	1.870	1.670	1.770	7.51	7.08	7.30	0.260	0.290	0.280	0.830	0.840	0.840	0.770	0.790	0.780
r2T4		13.22	13.90	13.50	1.910	1.700	1.800	7.58	7.15	7.37	0.250	0.270	0.260	0.790	0.800	0.800	0.720	0.740	0.730
r2T5		14.11	14.80	14.50	1.780	1.590	1.690	7.45	7.09	7.27	0.290	0.320	0.310	0.840	0.860	0.850	0.790	0.820	0.810
r2Mean		11.64	11.90	11.80	1.930	1.750	1.840	7.43	7.11	7.27	0.240	0.260	0.250	0.750	0.770	0.760	0.710	0.720	0.710
T1		9.34	9.41	9.43	2.090	1.980	2.030	7.53	7.49	7.51	0.200	0.220	0.210	0.580	0.590	0.590	0.550	0.550	0.550
T2		8.56	8.15	8.35	2.170	2.100	2.140	7.73	7.58	7.66	0.180	0.200	0.190	0.540	0.560	0.550	0.510	0.500	0.510
T3		10.58	10.80	10.71	1.990	1.890	1.940	7.62	7.39	7.51	0.250	0.270	0.270	0.680	0.700	0.690	0.660	0.670	0.660
T4		11.55	12.00	11.75	2.000	1.890	1.940	7.68	7.45	7.57	0.240	0.250	0.250	0.650	0.660	0.660	0.610	0.630	0.620
T5		12.24	12.80	12.55	1.940	1.850	1.900	7.57	7.37	7.47	0.270	0.290	0.290	0.700	0.700	0.700	0.680	0.700	0.690
T Mean		11.64	11.90	11.80	1.930	1.750	1.840	7.43	7.11	7.27	0.240	0.260	0.250	0.750	0.770	0.770	0.710	0.720	0.720
LSD 0.05	R	0.07	0.06		0.001	0.001		0.02	0.02		0.001	0.001		0.007	0.007		0.004	0.005	
	T	0.09	0.09		0.002	0.001		0.03	0.02		0.001	0.001		0.009	0.008		0.005	0.005	
	RxT	0.11	0.09		0.002	0.003		0.06	0.04		0.002	0.001		0.010	0.009		0.007	0.006	

highest values of total-N (0.29 and 0.32 %) at two seasons, respectively, by using PGPR and tea compost with rice straw. Similar finding were obtained by Badran *et al.* (2000). Concerning the Total P and K in soil, data in Table 4 declared that addition of PGPR tended to increase P and K in the soil, particularly with the combined inoculation treatment as compared with other treatments. The obtained results again confirmed the superiority of using the PGPR and tea compost when accompanied with rice straw. the highest values of total-P (0.84 and 0.86%) in two seasons, total-K (0.79 and 0.82%) was obtained from the treatment r2 T5 in two seasons, respectively . this result was mainly related to the ability of PGPR (Serratia , Bacillus and Pseudomonas) to dissolve insoluble phosphate via formation of organic acids and chelating substances. Similar trend was obtained by Heba (1999) and Laxminarayana and Patiram (2005). Moreover, the presence of organic materials can exhibit same trend phosphate solubilization beside their vital role in enhancement of phosphate dissolvers, as well as increasing soil moisture retention and thus more availability of phosphorus and potassium. These results are closed to those reported by Badran *et al.* (2000).

Soil biological activity: Data in Table 5 show some Soil biological activity properties of the saline soil after cotton harvesting as affected by different applied treatments in 2011 and 2012.

Data in Table 5 indicate the values of soil total count of bacteria, actinomycetes and fungi as affected by plowing with rice straw, PGPR inoculation and tea compost in the two seasons. Results pointed out that in all tested treatments, increasing the time of soil sampling from initial to flowering time increased the count of all tested microorganisms, while at harvest the counts started to decline.

Due to the effect of the tested treatment of either microbial inoculation or tea compost and their combination, initially, no definite trend was detected, since the count of bacteria, actinomycetes and fungi, slightly increased in response of these treatments all with or without rice straw during the growing season.

However, generally, the inoculation with either PGPR or tea compost together or separately increased the count of all tested microorganisms compared to those recorded by un inoculated treatments Same behavior was observed for the count of bacteria, actinomycetes and fungi, whether plowing with rice straw or not But there are clear differences between the seasons of 2011-2012. This trend was true in two seasons However the treatment (r2T5) of PGPR and tea compost applied as foliar spray with plowing rice straw gave the highest values of all soil biological activity parameters treatment. i.e., total bacteria count 48×10^7 and 59×10^7 CFU g^{-1} dry soil in the seasons of 2011/2012, respectively, total fungi 59×10^6 and 46×10^6 CFU g^{-1} dry soil and total actinomycetes 28×10^3 and 36×10^3 CFU g^{-1} dry in the seasons of 2011/2012, respectively and the treatment (r1T5) decreases without plowing rice straw. i.e., total bacteria count 25×10^7 and 38×10^7 CFU g^{-1} dry soil in the seasons of

Table 5: Influence of rice straw and bio-organic fertilizers on Soil biological activity under saline soils in 2011 and 2012

	Total Bact. counts (10^7 CFU g^{-1} soil)			Total Fungi (10^4 CFU g^{-1} soil)			Total actinon. (10^3 CFU g^{-1} soil)			CO_2 evolution (mg 100 g $soil^{-1}$)		
Treatments	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.
r1T1	15.00	16.00	15.50	17.00	19.00	18.00	10.00	11.00	10.50	15.00	16.00	15.50
r1T2	13.00	14.00	13.50	15.00	16.00	15.50	8.00	8.00	8.00	13.00	14.00	13.50
r1T3	22.00	30.00	26.00	21.00	24.00	22.50	13.00	14.00	13.50	22.00	30.00	26.00
r1T4	18.00	20.00	19.00	17.00	19.00	18.00	12.00	13.00	12.50	18.00	20.00	19.00
r1T5	25.00	38.00	31.50	20.00	25.00	22.50	14.00	15.00	14.50	25.00	38.00	31.50
r1Mean	18.60	23.60	21.10	18.00	20.60	19.30	11.40	12.20	11.80	18.60	23.60	21.10
r2T1	21.00	28.00	24.50	31.00	33.00	32.00	17.00	18.00	17.50	21.00	28.00	24.50
r2T2	19.00	22.00	20.50	27.00	29.00	28.00	14.00	15.00	14.50	19.00	22.00	20.50
r2T3	41.00	49.00	45.00	54.00	55.00	54.50	24.00	27.00	25.50	41.00	49.00	45.00
r2T4	35.00	56.00	45.50	49.00	52.00	50.50	22.00	25.00	23.50	35.00	56.00	45.50
r2T5	48.00	59.00	53.50	59.00	64.00	61.50	28.00	36.00	32.00	48.00	59.00	53.50
r2Mean	32.80	42.80	37.80	44.00	46.60	45.30	21.00	24.20	22.60	32.80	42.80	37.80
T1	18.00	22.00	20.00	24.00	26.00	25.00	13.50	14.50	14.00	18.00	22.00	20.00
T2	16.00	18.00	17.00	21.00	22.50	21.80	11.00	11.50	11.30	16.00	18.00	17.00
T3	31.50	39.50	35.50	37.50	39.50	38.50	18.50	20.50	19.50	31.50	39.50	35.50
T4	26.50	38.00	32.30	33.00	35.50	34.30	17.00	19.00	18.00	26.50	38.00	32.30
T5	36.50	48.50	42.50	39.50	44.50	42.00	21.00	25.50	23.30	36.50	48.50	42.50
T Mean	25.70	33.20	29.50	31.00	33.60	32.30	16.20	18.20	17.20	25.70	33.20	29.50
LSD 0.05	0.04	0.05		0.05	0.06		0.08	0.06		0.04	0.05	
	0.07	0.06		0.07	0.07		0.07	0.06		0.07	0.06	
	0.09	0.06		0.08	0.09		0.09	0.09		0.09	0.06	

2011/2012, respectively, total fungi 20×10^6 and 25×10^6 CFU g^{-1} dry soil in the seasons of 2011/2012, respectively, total actinomycetes 14×10^5 and 15×10^3 CFU g^{-1} dry in the seasons of 2011/2012, respectively. While, CO2 evolution with treatment plowing rice straw was 39, 42 mg CO_2/100 g dry soil day^{-1} in the seasons of 2011/2012, respectively, but CO2 decreases while plowing without rice straw achieved 15, 17 mg 100 g^{-1} dry soil day^{-1} (CO_2 evolution),at in the seasons of 2011/2012, respectively Huck *et al.* (1991) reported that the tea compost are known to stimulate microbial activity. In soil, the microbial activity increased up to 400 or 5000 times with the introduction of tea compost (300 ppm) into the soil. Beneficial bacteria and fungi were increased in the presence of tea compost and subsequently increased plant growth. It seems that the microorganisms produced excellent root stimulators. Organic fertilizers are obtained from animal or plant wastes. Continuous usage of inorganic fertilizer affects soil structure. Hence, organic manures can serve as alternative to mineral fertilizers for improving soil structure and microbial biomass (Enwall *et al*., 2005). Organic fertilizers have been known to improve the biodiversity (Birkhofer *et al*., 2008) and may prove a large depository for excess carbon dioxide (Lal, 2004). Organic fertilizers in comparison of the chemical fertilizers have lower nutrient content and are slow release but they are as effective as chemical fertilizers over longer periods of use (Naguib, 2011).

Data in Table 6 indicated that rice straw, PGPR, tea compost and their interaction exerted significant effect on fiber length, UI, fiber strength and fiber elongation. While, the interaction did not reach the significant value for fiber UI and fiber elongation % in both seasons. Soil applied with rice straw gave the highest values (31.89 and 31.77 mm) for fiber length; (83.34 and 83.15) for fiber UI; (40.1 and 40.0 g/tex) for fiber strength and (7.11 and 7.11%) for fiber elongation % in both seasons, respectively. The treatment containing PGPR in addition to tea compost surpassed the other fertilizer treatments. These results are in harmony with those obtained by Heba (1999), Laxminarayana and Patirani (2005) and Badran *et al.* (2000). As to, the interaction between rice straw and fertilizer treatments. The treatment containing the mix between PGPR and tea compost usually surpassed the others in case of the soil applied with rice straw for the fiber length and fiber strength characters in both seasons. This may be due to that, enhancing the plant growth, cellulose synthesis thus formed strong fiber. Because After rice straw decomposition some substance released such as the short chain organic acid (Badran *et al*., 2000; El-Hady *et al*., 2011). This helps to decrease the pH and the availability of mineral uptake and increasing the soil porosity. Also, make a suitable media to PGPR strains to growth.

It's clear from Table 7 that all the factors and the interactions were significant for all characters in both seasons except for the interaction of b+ in the second season. Micronaire value, fiber maturity and color parameters influenced positively in case of soil applied with rice straw (low b+ value is better than the high value). This because colored material usually located in the lumen and primary wall which are in large size in the immature fibers. While their amount decrease in matured fibers. This may be due to that, during the rice straw

Table 6: Influence of rice straw and bio-organic fertilizers on fiber mechanical and length parameters under saline soils in 2011 and 2012

		Fiber Length(mm)			UI			Fiber strength (g/tes)			Fiber elongation (%)		
Treatments		2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.
r1T1		30.83	30.67	30.75	82.33	82.06	82.20	39.160	39.110	39.140	7.100	7.100	7.100
r1T2		30.23	30.22	30.23	81.43	81.41	81.42	38.790	38.630	38.710	7.100	7.090	7.100
r1T3		31.62	31.57	31.60	83.12	82.78	82.95	39.190	39.110	39.150	7.110	7.100	7.110
r1T4		31.75	31.64	31.70	83.34	83.15	83.25	39.860	39.720	39.790	7.110	7.110	7.110
r1T5		32.11	32.11	32.11	83.77	83.62	83.70	40.600	40.660	40.630	7.120	7.120	7.120
r1Mean		31.31	31.24	31.28	82.80	82.60	82.70	39.520	39.450	39.480	7.110	7.100	7.110
r2T1		31.79	31.77	31.78	83.33	83.19	83.26	38.830	38.800	38.820	7.100	7.100	7.100
r2T2		31.53	31.31	31.42	83.10	82.70	82.90	39.450	39.440	39.450	7.110	7.100	7.110
r2T3		32.81	32.56	32.69	83.88	83.75	83.82	40.170	40.030	40.100	7.120	7.110	7.120
r2T4		33.00	32.78	32.89	84.12	84.00	84.06	41.760	41.460	41.610	7.120	7.110	7.120
r2T5		33.21	33.09	33.15	85.00	84.84	84.92	43.180	42.920	43.050	7.130	7.130	7.130
Mean		32.20	83.61	83.41	83.89	83.70	83.79	40.680	40.530	40.600	7.110	7.120	7.120
r2Mean		31.89	31.77	31.83	83.34	83.15	83.25	40.100	39.990	40.040	7.110	7.110	7.110
T1		31.30	31.20	31.30	82.80	82.61	82.70	39.000	39.010	39.000	7.100	7.100	7.100
T2		30.91	30.81	30.80	82.30	82.10	82.20	39.120	39.000	39.110	7.110	7.100	7.110
T3		32.21	32.11	32.11	83.51	83.31	83.40	39.720	39.600	39.600	7.120	7.110	7.120
T4		32.40	32.20	32.30	83.71	83.60	83.70	40.800	40.600	40.710	7.120	7.110	7.120
T5		32.71	32.61	32.60	84.41	84.20	84.30	41.910	41.800	41.800	7.130	7.130	7.130
T Mean		31.90	31.80	31.80	83.30	83.20	83.20	40.110	40.000	40.000	7.110	7.110	7.110
LSD 0.05	R	0.21	0.09		0.007	0.06		0.012	0.014		0.010	0.002	
	T	0. 11	0.18		0.02	0.09		0.015	0.071		0.009	0.003	
	RxT	0. 10	0.09		n.s	n.s		0.09	0.021		n.s	n.s	

Table 7: Influence of rice straw and bio-organic fertilizers on fiber color, fiber fineness and maturity parameters under saline soils in 2011 and 2012

		Micronaire value			Maturity ratio			Rd%			b+		
Treatments		2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.	2011	2012	rT M.
r1T1		3.640	3.600	3.620	0.820	0.810	0.820	74.38	74.21	74.30	8.61	8.73	8.72
r1T2		3.610	3.530	3.570	0.800	0.800	0.800	73.68	73.23	73.46	8.91	8.91	8.91
r1T3		3.700	3.680	3.690	0.830	0.820	0.830	74.68	74.26	74.47	8.80	8.88	8.84
r1T4		3.740	3.730	3.740	0.840	0.840	0.840	74.38	74.17	74.28	8.81	8.83	8.82
r1T5		3.810	3.770	3.790	0.850	0.840	0.850	75.48	75.26	75.37	8.80	8.80	8.80
r1Mean		3.700	3.660	3.680	0.830	0.820	0.830	74.52	74.23	74.37	8.79	8.83	8.81
r2T1		3.710	3.670	3.690	0.830	0.820	0.830	76.30	76.30	76.30	8.31	8.31	8.31
r2T2		3.680	3.620	3.650	0.820	0.820	0.820	74.43	74.86	74.65	8.50	8.57	8.53
r2T3		3.770	3.770	3.770	0.850	0.830	0.840	75.11	75.00	75.06	8.33	8.57	8.50
r2T4		3.870	3.800	3.840	0.870	0.850	0.860	77.31	76.17	76.74	8.17	8.26	8.23
r2T5		3.930	3.880	3.900	0.880	0.880	0.880	77.39	77.30	77.35	8.03	8.11	8.11
r2Mean		3.790	3.750	3.770	0.850	0.840	0.830	76.11	75.93	76.02	8.27	8.36	8.32
T1		3.680	3.640	3.660	0.830	0.820	0.830	75.34	75.26	75.30	8.46	8.52	8.50
T2		3.650	3.580	3.610	0.810	0.810	0.810	74.06	74.05	74.06	8.71	8.74	8.70
T3		3.740	3.730	3.730	0.840	0.830	0.840	74.90	74.63	74.77	8.57	8.73	8.65
T4		3.810	3.770	3.790	0.860	0.850	0.850	75.85	75.17	75.51	8.49	8.55	8.50
T5		3.870	3.830	3.850	0.870	0.860	0.870	76.44	76.28	76.36	8.42	8.46	8.45
T Mean		3.750	3.710	3.730	0.840	0.830	0.840	75.31	75.08	75.20	8.53	8.60	8.56
LSD 0.05	R	0.012	0.011		0.009	0.008		0.20	0.22		0.013	0.01	
	T	0.009	0.015		0.012	0.010		0.09	0.10		0.01	0.02	
	RxT	0.021	0.014		0.022	0.050		0.13	0.09		n.s	n.s	

decomposition some helpful substance released as mentioned above. In addition, to that increasing the soil amount of organic matter, phenols in a little amount but adequate to inhabit the weeds growth. These facts increase the plant growth and maturity. Consequently the fiber maturity and micronaire which express fiber fineness and maturity also. The treatment containing the mix of PGPR+tea compost T5 exhibited the highest values of the previous characters. It s worthy to mention that tea compost increase the mineral availability and the organic matter in soil. Released acids bonded with Na ions. Decrease the pH, this excited PGPR to grow in 2012 season (Heba, 1999; Laxminarayana and Patiram, 2005; Badran *et al*., 2000).

These bacteria, generally, improve the plant growth through direct effects on growth promoting, such as auxin and increasing the availability and uptake of soil nutrients. Provides antioxidant enzymes. This prevent the damaging effects of the highly ions accumulation. The reduction in growth rate result which, reflected on the

fiber quality as mentioned earlier. Thus its logic that the best interaction for all significant characters was between the rice straw and T5.

CONCLUSION

Generally, from this study it can be drawn that the use of the treatment of spraying the mix of bacterial strains (PGPR) and tea compost in the presence of rice straw is useful for the cotton fiber quality because it prevents the deleterious effects of soil salinity stress and enhances the soil chemical and biological properties.

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