J. Agric. Sci. Mansoura Univ., 28(8): 5915 - 5922, 2003

EFFECT OF TILLAGE SYSTEMS AND N FERTILIZATION INTERACTED WITH BIOFERTILIZER ON MAIZE GRAIN YIELD AND YIELD COMPONENTS UNDER MIDDLE AND UPPER EGYPTE CONDITION

Abou Keraisha, M. A. and B. S. Farghaly
Intensification Res. Sec., Field Crops Res. Inst., A. R. C., Giza

ABSTRACT

Six field experiments were carried out at El- Minia, Assiout and Sohag governorates in farmer fields during 1998 and 1999 seasons. The experiments were conducted to investigate the effect of tillage systems and N fertilizer combined with biofertilizer on grain yield of maize under farmer fields conditions. The experiments were in a split plot design, with four replications. Main plots devoted to tillage systems and the sub plots to fertilizer rates. Results showed that most the studied characters were not affected by the tillage systems,however, almost characters under CT tended to increase slightly compared with no-tillage(NT).While at Sohag the NT produced grain yields equal to those with CT. Results also, showed that the application of biofertilizer(Cerealine) with mineral nitrogen fertilizer at rate of 90kgN/fed or 120kgN/fed increased growth , yield and yield components as compared to the treatments without Cerealine. The increment in maize yield by Cerealine+90kgN/fed and Cerealin+120kgN/fed were 31.95 and 5.14% at El-Minia 36.04 and7.53% at Assiout and 35.7 and 3.86% at Sohag, respectively compared with the treatments without Cerealine.

It could be concluded that application of the biofertilizer Cerealine may be importance to enhancing maize yield with low rate of mineral N (90kg/fed) as compard to the high rate of N under tillage or no-tillage systems.

Keywords: Maize,Tillage systems,Fertilizer,Biofertilizer.

INTRODUCTION

Maize is one of the most important food and feed crops grown in Egypt. In order to increase maize productivity, it is necessary to pay particular attention to its nutrient supply. Use of nitrogen fixing bactria as a biofertilizer can reduce use of chemical fertilizers, decreased environmental pollution and decreased the infection of soil-borne diseases. Many reports indicated that the inoculation of seeds or seedlings of various C_3 and C_4 plants with associative N- fixing bacteria may improve plant growth and yield.. El-Borollosy *et al* (1986),Marriel *et al*(1986),El-Komy *et al*(1993)and Koreish *et al*(1998) they found that seed treament with Azotobacter or Azospirill um improved growth,yield and yield components of maize..

Omar (1995) showed that inoculation and nitrogen fertilizer had positive effect on both grain yield and nitrogen content in two rice cultivars investigated. He further added that inoculation in combination with full dose of mineral N increased the seed and nitrogen yields of G.175 by about 16 and 35.8%, respectively. Soliman and Abdel Monem (1995) found a significant increase in dry matter of corn inoculated with *Azotobacter* that received half the recommended dose of N (148.2kg/ha)as compared to uninoculated corn which received the full dose .Bedaiwi *etal*(1997concluded that biofertilization had the effectiveation in reducing normal rate of N fertilizer. Zahran et

al(1997 indicated that the application of the 75kgN/fed+Microbine to TWC 310 resulted in the highest significant increase in plant height,grain weight ear weight/plant and grainyield over other treatments.In addition the application of 90kgN/fed+Microbine on Balady maize was superior to other treaments. They conccluded that the application of the biofertilzer Microbine with minral nitrogen fertilizer at the rate of 75 or 95 kgN/fed was the most economical treatment. Radwan (1998) showed that the application of the combined treatment (biofertilizer + va-mycorrhizae inoculation + 107.1 kg N/ha) gave higher yields and showed a positive effect on all studied characters compared with controls. The percentage increases due to such treatment over the uninoculated control (142.9 kg N/ha.) were 9.76% for plant height, 7.49% for ear height, 12.78% for stem diameter, 10.2% for protein percentage, 15.35% for nitrogen percentage and 70.74% for phosphorus percentage .

On the other hand, results comparing the effectiveness of various tillage treaments on crop production have been reported by several researchers. Griffith *et al.*(1973) obtained better yields for both no-tillage and ridge planting, compared to plowing on well drained loamy soil and silt loamy soil, but no-till yield was reduced compared to plowing on a dark ,poorly drained soil. Thomas *et al.*(1973) noted that the nitrogen fertilizer application with no-tillage may be lost and its avilability decreased greater as compared to conventional tillage. Thomas and Morrison(1984) observed that grain sorghum yields under no-tillage treatment were not significantly lower than the conventional tillage. Lavin *et al.*(1987) indicated that no significant differences were detected in nitrogen fertilizer application between till-system and N-response. Griffith *et al.*(1988) showed that the reduced tillage systems has often decreased corn yields compared to conventional moldboard plowing for continous corn production in clay loamy or clay soils. Raimbault andVgn(1991) indicated that minimum tillage could be produce grain yields equal to those with conventional tillage when corn is grown in rotation.

MATERIALS AND METHODS

Six experiments were conducted at El- Minia, Assiout and Sohag governorates during 1998 and 1999 seasons. The main objective of these experiments was to get some information about the effect of tillage systemes and N fertilization combined with biofertilizer on yield and yield components of maize (*Zea mays* L.) at farmer fields. The N_2- fixing biofertilizer "Cerealine" used in the study was obtained from the Agricultural Microbiology Department, Soils, Water and Environment Research Institute, ARC., Giza. Inoculation with biofertilizers was performed by mixing seeds with the appropriate amount of (1 g/100gm seeds).Thereby each inoculated seed received approximately 10 millions bacteria on its surface.

Trials were designed in split-plot with four replications. Main plots were devoted to two tillage systemes i.e.conventional tillage(CT)and no-tillage(NT), whereas sub-plots were devoted to four fertilization treatments viz. 90kg N/fed , Cerealine +90 kg N/fed, 120kg N/fed , and Cerealine + 120

kg/fed.Soil types of experiments site were clay at El-Minia and Assiout and clay loamy at Sohag. The preceding crop was wheat at the three locations.

Maize ,TWC 310, was sown during the second week of June in all locations and seasons in ridges 70cm. apart, at distance of 25 cm. between hills and thinned after 21 days from sowing to one plant/hill. Plot size was $42m^2$ consisted of 10 ridges, each was 6m. in length. Nitrogen fertilizer as amonium nitrate (33.5%N) was added in two equal doses after thinning and after 45 days from sowing. Phosphorus fertilizer was added at the rate of 30 kg P_2O_5/fed in the form of mono calcium superphosphate (15.5% P_2O_5) at planting, while potassium sulphate (50-52% K_20) at the rate of 24 kg ko 20/fed was added with the last dose of nitrogen.

Maize was harvested 135 days after sowing. A sample of ten plants were taken randomly from each sub-plot to record plant height(cm), ear length(cm), no. ears/plant, no. of rows/ear, no. of kernels/row, weight of kernels/ear, shelling percentage. Grain yield/fed. were calculated from the plants obtained from all ridges of each sub-plot.

Combined analysis of data of both growing seasons was done according to Snedecor and Cochran (1980) using MSTAT- Computer V4 (1981) L. S. D test at 0.05 level of significance was used to compare between treatment means.

RESULTS AND DISCUSSION

I.Effect of tillage systems:

Data in Table (1) indicate that no. of ears/plant,no.of rows/ear,no.of kernels/row,shilling% and grain yield/fed at the three locations and plant height at Sohag were not significantly affected by tillage systems, However, all studied characters tended to increase slightly when the conventional tillage(CT) was used comparing with NT at El-Minia , Assiut and Sohag.

Table (1): Effect of tillage systems on growth characters, grain yield and its components of maize at El-Minia, Asslut and Sohag governorates (combined data of both seasons).

Location	Sowing Method	Plant Height (cm)	Ear Length (cm)	No. of ears/plant	No. of Rows/ ear	No. of Kernels/ row	Wt. of Kernels/ ear	Shilling %	Grain Yield/F. (ardab)
El-Minia	CT	252.91	21.89	1.18	13.49	45.25	233.66	80.96	20.83
	NT	242.16	21.33	1.13	12.91	43.65	221.33	80.5	19.87
	F-test	*	N S	N.S	N.S	N.S	*	N.S	NS
Assiut	CT	240.66	20.99	1.14	12.41	44.24	243.33	80.91	21.72
	NT	233.16	20.78	1.13	12.00	43.71	223.99	80.73	20.68
	F-test	*	NS	NS	N.S	N.S	**	N.S	N S
Sohag	CT	246.91	21.56	1.12	12.08	44.83	237.86	80.98	21.91
	NT	243.24	21.48	1.11	12.50	44.24	229.88	80.15	21.87
	F-test	NS	NS	NS	NS	NS	*	NS	NS

The increase slightly of yield components characters led to increase grain yield in both tillage systems.Conventional tillage resulted in non significant increase over the no-tillage system by one ardab/fed. at El-Minia and Assiut.The results are in agreement with those of Thomas and Morrison(1984),who observed that grain sorghum yields under the no-tillage

treatment were not significantly lower from the conventional tillage.Also, Grififtth *et al.*(1988), noted that the reduced tillage or no-tillage systems has often decreased corn yields compared to coventional in clay loamy or clay soils.While the grain yields under NT at Sohag was equale to those with CT.This result are in agreements with those given by Raimbault and Vgn(1991).

II. Effect of fertilization treatments:

As shown in Table (2) growth and yield attribute were significantly affected by fertilization rates. The application of Cerealine + 120kg N/fed resulted in the highest values followed by the treatment 120 N kg/fed The application of the combined treatments Cerealine +90 kg N/fed or Cerealine +120Nkg N/fed gave higher yields and had positive effect on all studied characters than uninoculated treatments at the three locations. Cerealine +90 kg N/fed resulted in signifacantly increase over the uninoculated(90kg N/fed) by 6.8,5.4.and 6.8% for plant height, 9.7,5.8 and11.3% for ear length, 12.3,9.8 and 6.0% for no. of ears/plant, 6.4,9.2 and8.6% for no. of rows/ear, 15.2,8.0 and 13.9% for no. of kernels/row, 1.1,7.5 and 15.9% for weight of kernels/ear and 4.,4.1 and7.2% for shilling percentage at El Minia,Assiout and Sohag,respectively. While Cerealine +120 kg N/fed had insignificantly increase over the uninoculated (120 kg N) except plant height(3.3%) at Sohag,ear length (6.3% and 5.4%) at El minia and Assiout respectively. Cerealine+120kgN/fed had significant increase over Cerealin+90kgN/fed for all studied characters except ear length at El-Minia and Sohag,no.of ears/plant and rows/ ear at El-Minia and shilling% at El-Minia.Whereas application of 120kg N/fed resulted in significant increase for all studied characters over application of 90 kgN/fed. at the three locations .

Table (2): Effect of fertilizer rates on growth characters, grain yield and its components of maize at El-Minia, Assiut and Sohag governorates (combined data of both seasons).

Location	Fertil-izer	Plant Height (cm)	Ear Length (cm)	No. of ears/ plant	No. of Rows/ ear	No. of Kernels/ row	wt. of Kernels/ Ear	Shilling %	Grain Yield/F. (ardab)
El-Minia	F1	229.66	20.01	1.05	12.5	39.35	215.00	78.00	15.91
	F2	245.50	22.06	1.18	13.31	45.33	217.35	81.16	20.85
	F3	254.16	21.53	1.16	13.33	45.66	238.00	81.6	21.76
	F4	260.99	22.85	1.22	13.66	47.5	239.60	82.16	22.88
	LSD	8.72	1.04	0.08	0.84	3.64	16.07	2.43	1.51
Assiut	F1	221.66	19.73	1.02	11.23	41.50	213.50	77.15	16.12
	F2	233.83	20.88	1.12	12.27	44.83	229.65	80.33	21.93
	F3	243.66	20.86	1.20	12.43	45.66	241.16	82.49	22.56
	F4	248.49	22.08	1.22	12.89	45.71	250.33	82.81	24.26
	LSD	5.40	0.41	0.06	1.04	3.38	11.76	4.03	1.04
Sohag	F1	230.83	19.76	1.00	11.23	39.33	193.83	76.30	16.76
	F2	246.66	22.00	1.06	12.20	44.83	224.66	81.83	22.75
	F3	247.33	21.88	1.19	12.69	46.66	250.66	81.83	23.58
	F4	255.50	22.45	1.21	13.00	47.33	251.33	82.33	24.49
	LSD	5.83	0.68	0.07	0.79	2.79	10.48	3.55	1.52

F1 = 90 Kg N/fed. **F2 = Cerealine + 90 Kg N/fed.**
F3 = 120 Kg N/fed. **F4 = Cerealine + 120 Kg N/fed.**

Results also show that biofertilization and various N levels significantly increased maize yield in all locations. The increments in maize yield for Cerealine + 90 and Cerealin + 120 kg N/fed were 31.05 and 5.14% at El- Minia, 36.04 and 7.53% at Assiout, and 35.7 and 3.86% at Sohag, respectively compared to the same treatments without Cerealin. While the increment in maize grain yield when using 120 kgN/fed were 36.77,39.95 and 40.7% over 90kgN/fed at El minia, Assiout and Sohag, respectively. it is clear that the application of the biofertilizer(Cerealine) with mineral nitrogen fertilizer at the rate of 90 or 120 kgN /fed. increased growth ,yield and its components compared to the treatment without Cerealine (control). These results are in agreement with those reported by Marriel (1986), El-komy *et al.* (1993), and Zahran *et al.* (1997).

The different in yield and its components between the two rates Cerealin+90 kgN/fed.and 90kgN/fed was greater than between the two rates Cerealin +120 kgN/fed and 120kgN/fed These results show that biofertilization could be of great significance when used with the reduced rate of mineral nitrogen fertilizer of 25% or less of the full recommended dose. These results are in agood line with those of Bedaiwi *et al.* (1997) and Zahran *et al.* (1997).

III. Interaction:

Data in Tables (3, 4 and 5) show that all studied characters were significantly affected by the interaction between methods of tillage systems and fertilizer treatments except no. of rows/ear and shilling%at all location, and no. of kernels/row at Assiut . The results show that application of the biofertilizer Cerealine + 90 or 120 kg N/fed increased values of studied characters under both tillage systems. The highest values in most maize traits were observed when Cerealine + 120 kg N/fed was used with CT system. The lowest values were observed when minimum rate of mineral nitrogen (90 kg N/fed.) was applied in both tillage systems .Grain yields in CT were higher compared with those in NT at El-Minia and Assiout, whereas,grain yields under NT with 90kgN/fed and with Cerealine+120kgN/fed. were higher compared with those in CT at Sohag . The results are in agreement with those given by Thomas *et al.*(1973)

Table (3): Effect of tillage systems × fertilizer rates interaction on growth characters, yield and its component of maize at El-Minia governorate (combined data of both seasons).

Sowing Method	Fertilizer Treaments	Plant Height (cm)	Ear Length (cm)	No. of ears/ plant	No. of Rows/ ear	No. of Kernels/ row	wt. of Kernels/ ear	Shilling %	Grain Yield/ F.(ardab)
CT	F1	234.33	20.26	1.06	12.7	40.0	217.0	78.0	15.93
	F2	252.66	22.03	1.23	13.3	45.3	221.7	82.3	21.0
	F3	261.66	22.53	1.20	14.0	47.0	248.0	81.3	22.3
	F4	263.33	22.76	1.23	14.0	48.7	248.0	82.3	24.1
NT	F1	225.00	19.76	1.04	12.33	38.7	213.0	78.0	15.9
	F2	238.33	22.10	1.14	13.33	45.3	213.0	80.0	20.7
	F3	246.66	20.53	1.16	12.66	44.3	228.0	82.0	21.23
	F4	258.66	22.93	1.21	13.33	46.3	231.2	82.0	21.66
	LSD	12.33	1.47	0.11	NS	5.14	22.7	NS	1.4

F1 = 90 Kg N/fed. F2 = Cerealine + 90 Kg N/fed.
F3 = 120 Kg N/fed. F4 = Cerealine + 120 Kg N/fed.

Table (4): Effect of tillage systems × fertilizer rates interaction on growth characters, yield and its component of maize at Assiut governorate (combined data of both seasons).

Sowing Method	Fertilizer Kg N/ fed	Plant Height (cm)	Ear Length (cm)	No. of ears/ plant	No. of Rows/ ear	No. of Kernels row	wt. of Kernels/ ear	Shilling %	Grain Yield/ F. (ardab)
CT	F1	225.00	19.10	1.00	11.30	42.00	231.00	77.00	16.03
	F2	235.00	21.26	1.13	12.35	44.63	241.00	82.00	22.86
	F3	249.00	21.10	1.23	12.66	44.66	245.66	82.33	23.00
	F4	253.66	22.53	1.23	13.33	46.00	255.66	82.33	25.00
NT	F1	218.33	20.36	1.05	11.16	41.0	196.00	77.30	16.20
	F2	232.66	20.50	1.12	12.20	43.03	218.30	79.66	21.00
	F3	238.33	20.63	1.17	12.20	44.30	236.66	82.66	22.13
	F4	243.33	21.63	1.21	12.46	45.50	245.00	83.30	23.40
	LSD	7.63	0.58	0.08	NS	NS	16.63	NS	1.47

F1 = 90 Kg N/fed. F2 = Cerealine + 90 Kg N/fed.
F3 = 120 Kg N/fed. F4 = Cerealine + 120 Kg N/fed.

Table (5): Effect of tillage systems × fertilizer rates interaction on growth characters, yield and its component of maize at Sohag governorates(combined data of the two seasons).

Sowing Method	Fertilizer Kg N/ fed	Plant Height (cm)	Ear Length (cm)	No. of ears/ plant	No. of row/ ear	No. of Kernels/ row	wt. Of Kernels/ ear	Shilling %	Grain Yield/ F. (ardab)
CT	F1	233.33	19.93	1.00	11.00	40.00	194.33	77.30	16.30
	F2	251.66	21.93	1.09	12.00	44.66	228.33	82.33	23.16
	F3	246.66	21.70	1.19	12.66	47.00	250.33	81.66	23.76
	F4	256.00	22.70	1.20	12.66	47.66	258.45	82.66	24.45
NT	F1	228.33	19.60	0.98	11.50	38.66	193.33	75.30	17.23
	F2	241.66	22.06	1.03	12.40	45.00	221.00	81.33	22.33
	F3	248.00	22.06	1.20	12.73	46.33	251.00	82.00	23.40
	F4	255.00	22.20	1.23	13.40	47.00	250.22	82.00	24.53
	LSD	8.24	0.96	0.10	NS	3.94	14.82	NS	2.15

F1 = 90 Kg N/fed. F2 = Cerealine + 90 Kg N/fed.
F3 = 120 Kg N/fed. F4 = Cerealine + 120 Kg N/fed.

REFERENCES

El- Borollosy, M. A.; Y.Z Ashac; M. E. El- Haddad; E. A. Saleh and El-Demerdash, M. F. (1986): Response of maize plants to inoculation with symbiotic N_2- fixers in the presence of different nitrogen levels and organic amendment with maize stalks. Second Conf. of the African Asso. for Biol. Nitrogen Fixation, 15- 19 December, 1986 Cairo, Egypt (Abstract).

El- Komy, H. M.; I. E. Vassyuk and A. M. Wahab (1993). Response of *Zea mays* varieties to inoculation with *Azospirillum*, pot and field experiment. The sixth International Symp. on Nitrogen Fixation with Non- legumes, Ismailia, Egypt, 6-10 September 1993, pp. 477- 478.

Bedaiwi,E.H.,Mitkees,A.M.Eid,M.A.M.,Iskandar,M.H.I.Sadek,Abo-Warda,A.M.andHamadaA.A, (1997)Some Egyption biofertilizers on sheat plants.Egypt J.Appl.Sci.,12(1): 57-61.

Griffith. D. R.; J. R. Mannering, H. M. Galloway, S. D. Parson and C.B.Richel (1973). Effect of eight tillage-planting systems on soil

temperature, percent stand, plant growth and yield of corn on five Indiana soil.Agron.J., 65:321-326..

Griffith,D.R.; E.J.Kladivka; J.V. Mannering (1988). Long-Term tillage and rotation effects on corn growth and yield on high and low organic matter,poorly drained soils.Agron.J., 80:599-605.

Koreish, E. A.; M. E. El- Fayyoumy; H. I. El- Maddah and H. M. Ramadan (1998). Response of (*Zea mays*) to inoculation with *Azotobacter* under various mineral nitrogen levels. Alex. Sci, Exch., 19 (1): 165- 176

Levin, A; D. P. Beegle and R. H. Fox (1987). Effect of tillage on residual nitrogwn availability from alfalfa to succeeding Corn Crops.Agron.J.79:34-36.

Marriel, I. E., Vasconcellos, C. A., Konzen, E. A. and Ferraz, J. M. G. (1986): Growth, chemical composition and yield of maize grown on Cerrados soil with biofertilizer. Resumes, Congress, Nacional – ole- Milho- e- Sorgo. 1986, No. 16, 16.

MSTAT. (1981). A microcomputer- program of the design management and analysis of Agronomic Research Experiments Michigan State Univ. U.S.A.

Raimbault, B. A. and T. J. Vgn (1991). Corn rotation and tillage effects on corn growth and soil structural stability.Agron.J., 83:979-985.

Omar, M. N. A. (1995). Evaluation of nitrogen fixed by *Azospirillum brasiliense* No. 40 (Cerealin) in two rice cultivars using N-15 dilution technique No. 40 Annals Agric. Sci., Ain Shams, Univ. Cairo, 40 (2), 559- 565.

Radwan, F. I. (1998): Response of some maize cultivars to va-mycrrhizal inoculation, biofertilization and soil nitrogen application. Alex. J. Agric., 43 (2): 43- 56.

Snedecor, G. W. and W. C. Cochran (1980). Statistical methods 7th Ed. Iowa State Univ- press, Ames, Iowa U. S. A.

Soliman, S. and Abdel M. Monem (1995). Influence of N labelled urea and Azotobacter on corn and nitrogen budget as affected by organic matter. Egypt J. Soil Sci., 35 (4): 415- 426.

Thomas, G. W.; B. L. Belvins; R. E. Phillps and M. A., MeMahon (1973): Effect of a killed sod mulch on nitrate morement and corn yield.Agron.J.64:736-739.

Thomas J.Gerik and John E.Morrison.(1984). No-Tillage of grain sorghum on a shrinking clay soil.Agron.J., 76:71-75.

Zahran, F. A.; El- Mersawy and Haifaa, S. Abdel Ghani (1997). Effect of nitrogenous and biofertilizers on late wilt, downy mildew diseases and yield of maize. Annals of Agric. Sci. Moshtohor, 161, 35 (4): 264/2652.

تأثيرالخدمة و التسميد بالأزوت المعدنى مع الحيوى على محصول الذرة الشامية تحت ظروف مصر الوسطى والعليا

محمد أبو العيون أبو كريشة وبدر سعد فرغلى
قسم بحوث التكثيف المحصولى- معهد بحوث المحاصيل الحقليه مركز البحوث الزراعية-الجيزه مصر

أقيمت ستة تجارب حقلية فى ثلاثة محافظات (المنيا – أسيوط – سوهاج) فى حقول المزارعين لدراسة تأثيرالخدمة و التسميد الأزوتى المعدنى مع التسميد الحيوى على محصول الذرة الشامية.

وكان التصميم المستخدم قطع منشقة مرة واحدة فى أربعة مكررات ، القطع الرئيسية وزعت عليها نظم الخدمة(خدمة؛ بدون خدمة) ، أما القطع الشقية فقد وزعت عليها معدلات التسميد الأزوتى والحيوى (١) ٩٠كجم ن/ف، (٢) ٩٠كجم ن + سيريالين، (٣) ١٢٠ كجم ن/ف، (٤) ١٢٠ كجم ن/ف + سيريالين).

أوضحت النتائج الآتى:

١-معظم الصفات المدروسة لم تتاثر بنظم الخدمة ومع ذلك كانت هناك زيادة طفيفه فى المحصول ومكوناته عند استخدام نظام الخدمه في المنيا واسيوط بينما نظام بدون خدمة فى سوهاج انتج محصولا مساوى تقريبا لمحصول نظام استخدام الخدمة .

٢-اضافة التسميد الحيوى(سيريالين) مع المعدنى عند معدلات٩٠؛١٢٠كجم اعطى زيادة فى النمو الخضرى والمحصول ومكوناته مقارنة بنفس المعاملات التى بدون تسميد حيوى.

٣-الزيادة فى محصول الذرة الشامية فى المعاملتين سيريالين+٩٠كجم ف وسيريالين+١٢٠كجم ف كانت ٥٠و٣١% و٥و٤١% فى المنيا، ٤٠و٣٦% و٣٥و٧% فى اسيوط و٧و٣٥% و١٤و٥% فى سوهاج.

ويتضح من ذلك:

اضافة التسميد الحيوى (سيريالين) مع المعدل المنخفض(٩٠كجم بالفدان) تكون ذات أهمية كبيرة عن الاضافة مع المعدل الاعلى(١٢٠كجم)بدون تسميد حيوى فى وجود خدمة او بدونها.