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EFFECT OF NITROGEN FERTILIZER RATES, TIMING AND SPLITTING APPLICATION ON WHEAT PLANT GROWN ON RECLAIMED SOILS

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ABSTRACT

Two field experiments were conducted in a private farm at El-Salhiea City; Sharkia Governorate during two winter seasons of 2006/2007 and 2007/2008 to investigate the effect of nitrogen fertilizer rates, timing and splitting application on wheat plant (*triticum aestvum L.)* on reclaimed soils.

Ten treatments were arranged in a split plot design with three replicates; which were the simple possible combination between five treatments of N-fertilization, (30, 60, 90, 120 and 150 kg N fed^{-1}) and two splitting doses of each N rates (1st splitting was divided to two equal doses 50 and 50% after 14 and 48 DAS and 2nd splitting was divided to four doses 40, 20, 20 and 20% after 14, 28, 48, 56 DAS).

The wheat plant growth progressively increased with increasing the nitrogen fertilizer rates and the superiority of plant height, chlorophyll and spike length observed with 120 kg N fed^{-1} rather with N fertilizer splitting to 2 or 4 doses.

The higher number of grains/spike observed with N fertilizer treatment at rate of 120 kg N fed^{-1} splitting to 4 doses. 1000 grain weight, straw and grain yield increased with increasing the rate of N fertilizer up to 120 kg N fed^{-1}. Treatment 120 kg N fed^{-1} in four doses as 40, 20, 20 and 20% after 14, 28, 48, and 56 DAS, recorded higher values of 1000 grain weight, straw and grain yield of wheat.

Significant difference in N, P and K concentration in boating and harvest stages in straw and in wheat grain were observed due to different levels, splitting and time of N application. In general, N, P and K% were increased with increasing the N fertilizers levels up to 120 kg N fed^{-1} with split to 2 doses, and 150 kg N fed^{-1} with split to 4 doses.

Under the same conditions of the experiment, it can be recommended to add the nitrogen fertilizer at 120 kg N fed^{-1} in four doses as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS, which gave the best result of quantity and quality of the wheat cultivated on sandy clay loam reclaimed soil.

Keywords: Nitrogens fertilizer rate, timing, splitting, wheat plant, Reclaimed soils.

INTRODUCTION

In recent years, cereal production in high input systems has been a major concern in many regions because of nitrogen (N) leaching to ground and surface water. Thus, there is a demand for friendly environment or more efficient management systems. These systems should have a high net N uptake to limit losing of soil N with leaching water. Wheat is one of the most important staple food crops of Egypt. Nitrogen (N) fertilizer is required on most reclaimed soils in Egypt to produce high-yielding winter wheat (*Triticum aestivum* L.). However, nitrogen is an important constituent of plant protoplasm, proteins, nucleic acid and chlorophyll. It is also present in small and varying amount in amines, amino acids, amino sugars and polypeptides. It plays vital role both during vegetative and reproductive phases of the crop. Among major plant nutrients, nitrogen is more important in increasing wheat yield but it is most frequently found deficient as applied nitrogen is subjected to various kinds of losses viz., i) Runoff, ii) Ammonia volatilization, iii) Leaching and iv) Denitrification (Prasad and Power, 1997).

Among the nutrients, nitrogen plays an important role in wheat production. Low level of nitrogen results in lower yield and higher level of nitrogen causes environmental pollution and also increases cost of cultivation. According to Lo´pez *et al*. (2001), N fertilizer proved to be a key factor in determining breadmaking quality, and the best strategy available to the farmer for optimizing wheat quality.

The time and rate of N application are critical management decisions because they can influence the N-fertilizer uptake efficiency which are highly correlated with wheat yields (Alcoz *et al*., 1993) and (Weisz *et al*., 2001).

Several hard red winter wheat studies have shown that N applications after the boot stage can increase yield and, when moisture is adequate for N uptake after application, grain protein increases (Sowers *et al*., 1994). Delayed spring N application can promote grain protein accumulation more than yield (Ottman *et al*., 2000). Hamid and Sarwar (1976) detected that nitrogen application significantly increased protein content in grain and splitting nitrogen into six doses further increased the protein content over single or two split application. Dighe *et al*. (1994) noted that splitting of nitrogen fertilizer dose into three splits (10% nitrogen as basal + 60% nitrogen at CRI top dressed + 30% nitrogen at late jointing) plus basal P2O5 recorded the highest yield. According to Borghi *et al*. (1997), the beneficial effect of N splitting in the Mediterranean climate, may be related to reduction of N losses and to a better translocation of pre-anthesis assimilates to the grain.

The aim of the present study is to determine the effects of N fertilizer rate, timing and splitting on plant growth, yield and yield components and chemical composition of wheat cultivated on a reclaimed soil.

MATERIALS AND METHODS

Two field experiments, were conducted in a private farm at El-Salhiea City; Sharkia Governorate during two winter seasons of 2006-2007 and 2007-2008 to investigate the effect of nitrogen fertilizer rates, timing and splitting application on wheat plant (*triticum aestvum L.)* grown on reclaimed soil.
Some chemical and physical characteristics is shown in Table 1.

Table 1: The mean values of some chemical and physical properties of the experimental soil:

Season	pH *	EC ** dS/m	Ions conc. meq/100g soil								SP%
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{--}	HCO_3^{-}	Cl^{-}	SO_4^{--}	
1st	7.9	3.64	0.59	0.49	0.91	0.04	0.00	0.27	0.68	1.08	47.0
2nd	8.1	3.59	0.56	0.51	0.89	0.07	0.00	0.33	0.71	0.99	44.0
	Mechanical Analysis %				Tex. Class		OM%	$CaCO_3$ %	Avail. ppm		
	C. sand	F. sand	Silt	Clay					N	P	K
1st	13.32	38.56	21.15	26.97	Sandy clay loam		0.89	9.72	37.0	6.9	420
2nd	11.93	37.42	25.16	25.49			0.77	7.88	41.0	4.3	375

* pH 1:2.5 soil suspension. ** EC soil paste extract.

The experimental area was ploughed, rolled and divided into plots. The area of each sub plot was $14m^2$ (3.5 m wide and 4m length) seeds of wheat (Giza 168) sowing at the rate of 60 kg fed^{-1}, on 15 and 17 November in 1^{st} and 2^{nd} seasons, respectively. The sowing was done using drill hand machine. After 10 days from sowing number of plants per plot was kept at the rate of 100 plants.

Ten treatments were arranged in a split plot design with three replicates; which were the simple possible combination between five treatments of N-fertilization, (30, 60, 90, 120 and 150 kg fed^{-1}) and two splitting doses of each N rates (1^{st} splitting was divided to two equal doses 50 and 50% at 14 and 48 days after sowing (DAS) and 2^{nd} splitting was divided to four doses 40, 20, 20 and 20% at 14, 28, 48, 56 DAS). Thus, the total numbers of treatments were conducted in 30 plots. The agricultural practices and irrigation were done according to the recommendations of the Ministry of Agriculture for wheat plant. However, irrigations were attained after soil moisture dose not drop below 70% from field capacity of soil during the growing seasons.

Ten plant samples were collected from each plot, at boating stage (70 DAS) and subjected to chlorophyll content determination and N,P and K. At harvest stage (20 April) the plant samples were randomly taken from each plot to determine; No of grains/spike, 1000 grain weight (g) grain yield (ton fed^{-1}), plant height (cm) and straw yield ton fed^{-1}.

Statistical analysis.

Using CoStat (Version 6.303, CoHort, USA, 1998–2004).

Soil and plant analysis Richard (1954), Jackson (1967), Dewis and Fertias (1970), Hesse (1971), Cottenie *et al*., (1982). Yadava (1986).

RESULTS AND DISCUSSION

1- Wheat plant growth:

Plant height (cm):

Data of plant height recorded at harvest stages in both seasons are presented in Table 2. The plant height progressively increased with increasing the nitrogen fertilizer rates and the superiority of plant height was observed with 120 kg N fed^{-1} whatever N fertilizer was split 2 or 4 doses. Data on plant height in both seasons showed that treatment of 120 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS which recorded 102.37, 103.90 cm in the 1^{st} and 2^{nd} seasons, respectively, was highly significantly than other treatment of (120 kg N fed^{-1} in two splits as 50 and 50% after 14 and 48 DAS) which recorded (96.59, 98.33 cm) in both seasons, respectively.

Chlorophyll:

Data pertaining to chlorophyll (SPAD) in leaf are presented in Table 2. Among the levels and time of N application, treatment 120 kg N per ha in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS recorded significantly higher values of chlorophyll (65.47, 64.49) in 1st and 2nd seasons, respectively, followed by treatment (120 kg N fed^{-1} in two splits as 50 and 50% after 14 and 48 DAS) which recorded (64.02, 63.25) in both season, respectively, over other treatments including N fertilizer rate 150 kg N fed^{-1} either with splitting to 2 or 4 doses. However, the lowest values of chlorophyll (24.00, 23.71 and 24.37, 24.00) were recorded in treatment of 30 kg N fed^{-1} in two and four splits in both seasons, respectively.

Spike length:

Data on spike length are presented in Table 2 the spike length influenced by the treatments in both seasons. Different levels and time of N application exhibited significant differences in spike length. At treatment (120 kg N per ha in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) accounted for significantly higher spike length (13.37, 13.17 cm) in both seasons over other treatments. The next best treatment was (120 kg N fed^{-1} in two splits as 50 and 50% after 14 and 48 DAS) (13.14, 13.01 cm) in both seasons, respectively. The least spike length recorded in treatment (30 kg N fed^{-1} either with two or four splits).

Table 2: Effect of nitrogen fertilizer rates, timing and splitting application on wheat plant growth

Treatments		Plant height (cm)		Chlorophyll		Spike length (cm)	
Splitting N	**N rates**	**1st season**	**2nd season**	**1st season**	**2nd season**	**1st season**	**2nd season**
2 doses	**30**	74.13	75.46	24.00	23.71	9.59	9.50
	60	78.16	79.56	32.17	31.78	9.35	10.35
	90	85.16	86.69	42.27	41.76	11.29	11.17
	120	96.59	98.33	64.02	63.25	13.14	13.01
	150	92.02	93.68	52.97	52.33	12.15	12.03
4 doses	**30**	76.43	77.58	24.37	24.00	9.86	9.71
	60	80.28	81.49	32.90	32.40	10.63	10.47
	90	87.18	88.49	42.83	42.19	11.51	11.34
	120	102.37	103.90	65.47	64.49	13.37	13.17
	150	94.72	96.14	54.44	53.63	12.34	12.15
LSD 5%		2.013	2.315	1.294	1.156	0.571	0.526

These results are contermed by (Halikatti, 1980) which detected that under irrigated conditions, on medium black soil, application of nitrogen levels (80 and 120 kg / ha) in two splits, half at sowing and remaining half at 25 days after sowing recorded higher plant height than application of nitrogen all at sowing or in three splits (one third each at sowing, 25 and 55 DAS) or in four splits (one fourth each at sowing, 25, 55 and 70 DAS). Patel (1999) on a clay loam soil reported that application of N in a ratio of 50: 25: 25 per cent at sowing, 21 and 45 DAS, respectively recorded significant improvement in growth and yield parameters i.e. plant height, number of productive tillers per plant, length of panicle, number of grains per panicle, 1000-grain weight, higher grain yield and straw yield as compared to other methods of nitrogen application. Ananda (2004) reported that split application of N as half basal + one fourth at 30 DAS + one fourth at 60 DAS recorded maximum dry matter production, plant height, number of tillers and maximum leaf area. On the other hand Pasha (2005) reported that plant height, dry matter production and leaf area did not vary significantly between two splits (one third N as basal + two third at first node stage) and three splits (half N as basal + one fourth N at tillering + one fourth N at tillering).The level of N applied was 120 kg per hectar. Maiti and Das (2007) expressed that SPAD meter readings for N management in wheat showed that values of SPAD significantly increased with increasing levels of N and SPAD treated N plots showed higher nitrogen use efficiency over fixed N treatment in wheat and further showed that SPAD value of 37 was better than SPAD-35 for the best management of N in wheat

2- Wheat yield and yield components: Regardins to grains/spike Table 3 reveal that higher number of grains/spike (62.32, 63.07) was obtained with N fertilizer treatment at rate of 120 kg N fed^{-1} splitting to 2 doses and (63.75, 64.64) with splitting N fertilizer treatment to 4 doses in both seasons, respectively. Treatment of (120 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) achieved the superiority results higher than 150 kg N fed^{-1} with splitting N fertilizer to 4 doses. While 30 kg N fed^{-1} rather with splitting N fertilizer to 2 or 4 doses recorded significantly lower number of grains/ spike (53.49, 54.13 and 54.96, 55.45) in the 1^{st} and 2^{nd} seasons, respectively. Regardins to 1000 grain weight**,** results illustrated in Table 3. revealed that 1000 grain weight increased with increasing the rate of N fertilizer up to 120 kg N fed^{-1} and there after it showed decreasing trend.

However, treatment of120 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS and or splits as 50 and 50% after 14 and 48 DAS recorded higher values of 1000 grain weight.

The least 1000 grain weight (55.25, 56.08 and 56.44, 57.45 gm) recorded in treatment 30 kg N fed^{-1} in two and four splits in both seasons, respectively. Regardins to Straw yield as influenced by different levels and time of N application Table 3. Showed that Straw yield significantly influenced by the treatments in both seasons. However, significantly higher straw yield (6.57, 6.64 and 6.72, 6.69 ton fed^{-1}) was recorded in treatment (150 kg N per fed in two splits as 50 and 50% after 14 and 48 DAS) and or in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS compares with other treatments. However, Treatment (30 kg N fed^{-1} in two and four splits in both seasons) recorded lowest straw yield (5.15, 5.21 and 5.26, 5.24 ton fed^{-1}). Regardins to grain yield as influenced by different levels, splitting and time of N application Table 3. Showed that Nitrogen application in different levels and splits produced significant variation in grain yield at different seasons. However, treatment of (120 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) and or N fed^{-1} in two splits as 50 and 50% after 14 and 48 DAS) accounted for significantly higher grain yield (3.532, 3.515 and 3.409, 3.460 t fed^{-1}) in both seasons, respectively. The lowest grain yield (2.013, 2.043 and 2.055, 2.044 t fed^{-1}) was recorded in treatment (30 kg N fed^{-1} in two and four splits).

However, Sinha (1973) reported that time of application did not cause significant difference in dry weight of wheat at any stage except at boot stage when single application of nitrogen gave significantly higher plant dry weight than with three split application. Dhuka *et al*. (1992) on loamy sand soil at Junagadh (Gujarat) stated that application of nitrogen in three splits as half at basal + one-fourth top dressed at 21-25 DAS + one-fourth top dressed at 35-

40 DAS increased the grain and straw yields by 49.9 and 23.9 per cent, respectively over no split and by 9.0 and 11.0 per cent over two splits (half N top dressed at 21-25 DAS plus half to N dressed at 35-40 DAS). Deor and Pathik (1997) reported that application of nitrogen not exceeding beyond 60 kg per ha applied in equal splits i.e. half N at sowing + half N one month after sowing on clay loam soil at Sunder Nagar (HP) caused enhancement in grain and straw yield as compared to full nitrogen applied at sowing. Ananda (2004) reported that among split application of nitrogen, nitrogen applied as half basal + one-fourth at 30 DAS + one-fourth at 60 DAS recorded higher grain and straw yields as compared to nitrogen applied as half basal + half at 30 DAS.

Table 3: Effect of nitrogen fertilizer rates, timing and splitting application on wheat yield and yield component.

Treatments		No. of grains/spike		1000 grain weight (g)		Straw yield ton fed^{-1}		Grain yield ton fed^{-1}	
Splitting N	**N rates**	**1st season**	**2nd season**	**1st season**	**2nd season**	**1st season**	**2nd season**	**1st season**	**2nd season**
2 doses	**30**	53.49	54.13	55.25	56.08	5.15	5.21	2.013	2.043
	60	55.36	56.03	56.39	57.23	5.64	5.70	2.362	2.397
	90	57.37	58.06	58.72	59.60	6.20	6.26	2.752	2.793
	120	62.32	63.07	63.85	64.81	5.14	5.19	3.409	3.460
	150	60.17	60.89	61.91	62.84	6.57	6.64	3.088	3.134
4 doses	**30**	54.69	55.45	56.44	57.45	5.26	5.24	2.055	2.044
	60	56.87	57.67	57.85	58.89	5.73	5.71	2.431	2.418
	90	59.02	59.85	60.26	61.34	6.30	6.28	2.794	2.780
	120	63.75	64.64	65.88	67.07	5.37	5.35	3.532	3.515
	150	61.48	62.34	63.49	64.63	6.72	6.69	3.181	3.166
LSD 5%		0.217	0.224	0.241	0.241	0.147	0.152	0.076	0.081

Generally, it could be ststed that it is pointed out that split application had beneficial effect on yield and yield components. It is therefore, required to be added split nitrogen in appropriate quantity to the soil at a time when it could be best utilized by crop plants for their optimum response for increasing yield of wheat grains.

3- Wheat chemical composition: Regardins to NPK % in boating stage data on nitrogen, phosphorus and potassium concentration are presented in Table 4. Showed a Significant difference in N, P and K concentration in boating stage due to different levels, splitting and time of N application. In general, N, P and K% were increased with increasing the N fertilizers levels up to 120 kg N fed^{-1} with split to 2 doses, and or 150 kg N fed^{-1} with split to 4 doses.

Data in Table 4 reveal that treatment of 150 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) resulted in significantly higher N,P,K concentration (4.99, 4.95%), (0.53, 0.53%) and (5.12, 5.17%) respectively, in boating stage. However, the lowest N% (2.48, 2.46 and 3.17, 3.20%), P% (0.24, 0.24 and 0.29, 0.30) and K% (2.29, 2.30 and 2.64, 2.64) were recorded in treatment 30 kg N fed^{-1} in two and four splits in both seasons respectively.

Table 4: Effect of nitrogen fertilizer rates, timing and splitting application on chemical composition (NPK%) of wheat at boating stage.

Treatments		N%		P%		K%	
Splitting N	N rates	1st season	2nd season	1st season	2nd season	1st season	2nd season
2 doses	**30**	2.48	2.46	0.24	0.24	2.29	2.30
	60	3.01	2.99	0.30	0.31	3.08	3.07
	90	3.55	3.56	0.36	0.36	3.61	3.62
	120	4.41	4.45	0.49	0.49	4.68	4.65
	150	4.15	4.14	0.44	0.45	4.41	4.42
4 doses	**30**	3.17	3.20	0.29	0.30	2.64	2.64
	60	3.33	3.34	0.33	0.33	3.04	3.02
	90	3.83	3.84	0.38	0.38	3.59	3.60
	120	4.40	4.37	0.45	0.46	4.35	4.33
	150	4.99	4.95	0.53	0.53	5.12	5.17
LSD 5%		0.024	0.019	0.002	0.003	0.025	0.219

Regardins to NPK % in straw data presented in Table 5 showed nitrogen, phosphorus and potassium concentration in wheat straw after harvest of crop as influenced by different levels, splitting and time of N application. Data revealed a significantly higher nitrogen, phosphorus and potassium concentration (0.97, 0.92%), (0.13, 0.15%) and (1.09, 1.07%) were observed in straw at (150 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) compared to rest of the treatments. However, it was on par with (120 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) which resulted in N% (0.88, 0.85 %), P% (0.11, 0.13%) and K% (0.95, 0.91%) followed by treatment (120 kg N fed^{-1} in two splits as 50 and 50% after 14 and 48 DAS) which resulted in N% (0.86, 0.84%), P% (0.12, 0.14 %) and K% (1.01, 0.99%). However, treatment (30 kg N fed^{-1} in two and four splits in both seasons) recorded lowest N, P and K% in wheat straw.

Table 5: Effect of nitrogen fertilizer rates, timing and splitting application on chemical composition (NPK%) of wheat straw after harvest.

Treatments		N%		P%		K%	
Splitting N	N rates	1st season	2nd season	1st season	2nd season	1st season	2nd season
2 doses	**30**	0.49	0.46	0.06	0.07	0.49	0.49
	60	0.60	0.58	0.08	0.09	0.63	0.62
	90	0.71	0.66	0.09	0.11	0.78	0.74
	120	0.86	0.84	0.12	0.14	1.01	0.99
	150	0.80	0.77	0.11	0.13	0.93	0.87
4 doses	**30**	0.56	0.53	0.07	0.12	0.51	0.47
	60	0.66	0.64	0.08	0.10	0.66	0.63
	90	0.76	0.72	0.10	0.11	0.78	0.74
	120	0.88	0.85	0.11	0.13	0.95	0.91
	150	0.97	0.92	0.13	0.15	1.09	1.07
LSD 5%		0.002	0.001	0.0012	0.0014	0.0024	0.0026

Regardins to NPK% in grain, It is obvious from the data showed in Table 6 that treatment (150 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS) accounted for significantly higher nitrogen, phosphorus and potassium concentration (4.25, 3.86 %), (0.25, 0.25 %) and (0.25, 0.25 %), respectively in wheat grain. However, it was on par with (120 kg N fed^{-1} in four splits as 40, 20, 20 and 20% after 14, 28, 48, 56 DAS). The lowest nitrogen, phosphorus and potassium concentration (2.16, 1.92 %), (0.11, 0.11 %) and (0.12, 0.13%) in wheat grain at (30 kg N fed^{-1} in two splits in both seasons) respectively.

These results are confirmed by Halikatti (1980) found that application of N in four splits recorded higher N percentage in whole wheat plants, straw and grains over application of N all at sowing or with two splits or three splits in both 80 and 120 kg N per ha doses. Dhuka *et al*. (1992) on loamy sand soil reported that application of N in three splits (half N at basal + one-fourth N top dressed at 21-25 DAS + one-fourth top dressed at 35-40 DAS) increased the N uptake by grain and straw by 46.4 and 72.0 per cent, respectively over application of N in single dose .

Table 6: Effect of nitrogen fertilizer rates, timing and splitting application on chemical composition (NPK%) of wheat grain.

Treatments		N%		P%		K%	
Splitting N	N rates	1st season	2nd season	1st season	2nd season	1st Season	2nd Season
2 doses	30	2.16	1.92	0.11	0.11	0.12	0.13
	60	2.61	2.43	0.15	0.15	0.15	0.15
	90	3.16	2.78	0.17	0.18	0.17	0.18
	120	3.78	3.55	0.23	0.24	0.23	0.24
	150	3.53	3.30	0.21	0.21	0.21	0.21
4 doses	30	2.43	2.20	0.12	0.13	0.12	0.13
	60	2.87	2.68	0.16	0.16	0.16	0.16
	90	3.33	3.00	0.18	0.19	0.18	0.19
	120	3.81	3.56	0.22	0.22	0.22	0.22
	150	4.25	3.86	0.25	0.25	0.25	0.25
LSD 5%		0.024	0.021	0.0023	0.0019	0.0021	0.0017

Conclusion and recommendation

It can be concluded that wheat yield potential is undoubtedly associated with their tendency to consume high dose of nitrogen. In order to get maximum benefit from nitrogen nutrient, it should not only be applied in right quantity but also at right time. Application of nitrogen not synchronizing with the demand of the plant may result in various losses.

It is pinpointed that split application had beneficial effect on yield and yield components. Therefore, it is required to be added split nitrogen in appropriate quantity to the soil at a time when it could be best utilized by crop plants for their optimum response for increased yield of wheat grains.

It is evident that the nitrogen, phosphorus and potassium percentage increased with increased in levels of nitrogen fertilizer application and number of splits.

Under the same conditions of the experiment, it can be recommended to add the nitrogen fertilizer at (120 kg N fed^{-1} in four splits as

40, 20, 20 and 20% after 14, 28, 48, 56 DAS), which gave the best result of quantity and quality of the wheat cultivated on reclaimed sandy clay loam soil.

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تأثير معدلات التسميد النيتروجيني وتقسيم المعدلات وتوقيت إضافتها على نبات القمح المنزرع في التربة المستصلحة

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أجريت تجربتان حقليتان بمزرعة خاصة بمدينة الصالحية، محافظة الشرقية خلال الموسمين الشتويين 2007/2006 و 2008/2007 لدراسة تأثير معدلات إضافة السماد النيتروجيني وتأثير تقسيم هذه المعدلات وتوقيت إضافتها على نبات القمح بأرض مستصلحة.

نظمت عشرة معاملات في تصميم قطع منشقة مع ثلاث مكررات، التي تكونت من خمسة معاملات نيتروجين (30، 60، 90، 120 و 150 كجم / فدان) كل معاملة قسمت إما إلى (جرعتين متساوية 50 و 50 ٪ بعد 14 و 48 يوم من الزراعة أو أربعة جرعات 40، 20، 20 و 20 ٪ بعد 14، 28، 48، 56 يوم من الزراعة).

أوضحت النتائج أن أعلى معدلات لقياسات النمو لكل من إرتفاع النبات، طول السنبلة، الكلوروفيل، عدد حبوب السنبلة و وزن الـ 1000 حبة أمكن الحصول عليه بإضافة 120 كجم ن / فدان سواء مع تقسيمها إلى جرعتين أو أربع جرعات مع تفوق تقسيم المعاملة إلى أربع جرعات وهي 40، 20، 20 و 20 ٪ بعد 14، 28، 48، 56 يوم من الزراعة.

هذا وقد أدى إضافة النيتروجين بمعدل 150 كجم نيتروجين / فدان مع تقسيمه إلى 4 جرعات أو إضافته بمعدل 120 كجم ن / فدان مع تقسيمه إلى جرعتين إلى زيادة تركيز النيتروجين والفسفور و البوتاسيوم فى الحبوب أو القش.

تحت نفس ظروف التجربة، يمكن أن يوصى بإضافة السماد النيتروجيني بمعدل (120 كجم نيتروجين للفدان في أربعة جرعات هي 40، 20، 20 و 20 ٪ تضاف عند 14، 28، 48، 56 يوم من الزراعة)، للحصول على أفضل النتائج لكمية ونوعية القمح المزروعة في التربة المستصلحة.

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