J. Plant Production, Mansoura Univ., Vol. 9 (8): 685 - 688, 2018

Evaluation of some Crop Sequences and Nitrogen Levels on Wheat Productivity

Sorour, S. Gh. R.[1]; Sahar A. M. Sherif[2] and Neama M. K. Melad[2]
[1] **Agronomy Dept., Fac. Agric., Kafrelshiekh Univ., Egypt.**
[2] **Sakha, Kafrelshiekh, Field Crop Research Institute, ARC. Egypt**

ABSRACT

Two field experiments were conducted on clay soil in 2015-16 and 2016-17 seasons at the Experimental Farm of Sakha Agricultural Research Station, Kafr El--Sheikh, Egypt, to exploit the land in the period from harvesting early rice cultivars to grow wheat in suitable date by planting the temporary fodder crops to increase economic returns. The trials studied the response of wheat cv. Giza 171 to some crop sequences systems and nitrogen rates. Each experiment included three rice cultivars (Sakha 101, Sakha 106 and Giza 179) as a preceding crop, three intermediate crop (maize and berseem fahl as mono-cut forage crops as well as fallow land) and three nitrogen rates (50, 75 and 100 kg N fed.$^{-1}$) in wheat. The experimental design was Split Split-plot with three replications. Main plots were assigned to preceding crops (rice cultivars), sub plots to intermediate crops and sub-sub plots to nitrogen rates. Rice cultivars as preceding crop had no significant effect on all studded wheat traits, namely plant height, spikes number m^{-2}, spike length, spike weight and grains number spike^{1}, 1000-grain weight, grain yield, straw yield and harvest index in both seasons. There was an apparent difference due to intermediate crop in all mentioned traits of wheat, except harvest index in the two seasons. The sequence system of berseem fahl –wheat resulted in a significant increase in plant height, spikes number m^{-2}, spike length, spike weight and grains number spike^{1}, grain yield and straw yield of wheat compared with maize–wheat and fallow–wheat sequence systems in the two seasons. However, maize–wheat and fallow–wheat sequence systems substantially increased 1000-grain weight of wheat than the berseem fahl–wheat system. Wheat grown after maize or fallow soil was statistically at par in all mentioned treats in both seasons. Plant height, spikes number m^{-2}, spike length, grains number spike^{1} and straw yield and of wheat gradually increased by increasing nitrogen rate from 50 to 100 kg N fed.$^{-1}$. Spike weight, grain yield and harvest index of wheat was markedly increased by increasing nitrogen rate from 50 to 75 kg N fed^{-1}, then those decreased at 100 kg N fed^{-1}. Application of 100 kg N fed^{-1} produced the lightest 1000-grain weight of wheat in both seasons, while the heaviest ones were obtained from adding 75 and 50 kg N fed^{-1} in the first and second seasons, respectively. Grain yield was significantly affected by the interaction between intermediate crop and nitrogen levels. Wheat grown after berseem and received any nitrogen rate was among those having high grain yield in both seasons. It can be concluded that the sequence system of rice-berseem fahl–wheat received 50 kg N fed^{-1} could be recommended for optimum grain yield of wheat at Kafr El-Shiekh Governorate. This result indicated that application of berseem fahl as intermediate crop can be saved 50 kg N fed^{-1} without reduce grain yield of wheat, in addition to the producing green forage to use in animal food.

INTRODUCTION

Food shortage in Egypt is one of the most important problems facing us because of the limited land area and the increasing population, which makes it difficult to provide food needs. Agricultural intensification has become an imperative to increase in agricultural production per unit of inputs (Rockström *et al*., 2017). One of the principle applications is using multiplicity of sequential cropping systems amounting to more than two crops per year through applying innovative crop sequence.

Many studies evaluated new short duration varieties of rice for early cultivated date in late April and harvested from late August until the middle of September (Khalifa *et al*., 2014; Khalifa, 2009). There is a period of about three months to grow another crop like berseem fahl and maize as fodder before wheat.

Nitrogen fertilizer plays an important role in the growth and production of wheat. In this connection, Gharib *et al*. (2016); Hafez and Gharib (2016) and White *et al*. (2017) found that application of nitrogen fertilizer improved growth, yield attributes and grain yield of wheat.

This study was to investigate the response of wheat to crop sequences (rice– intermediate crop –wheat) and nitrogen rates.

MATERIALS AND METHODS

Two field experiments were conducted in 2015-16 and 2016-17 seasons at the Experimental Farm of Sakha Agricultural Research station, Kafrelsheikh, Egypt. The trials studied the response of wheat cv. Giza171 to some crop sequences system and nitrogen rates. Soil analyses according the methods of Black *et al*. (1965) indicated that the Soil was clay in texture with a pH of 7.9. Chemical properties of soil were 1.5 % for organic matter, 0.13% for total N, 14.8 mg kg^{-1} for available P and 230 mg kg^{-1} for available K.

The experiment included three factors as follows:

1- Rice cultivars ((Sakha 101, Sakha 106 and Giza 179) as a preceding crop.
2- Mono-cut forage crops (maize and berseem Fahl) and fallow land as intermediate crop.
3- Urea fertilizer(46.5% N) as N source for wheat was applied at the rates of 50, 75 and 100 kg N feddan^{-1}

The experimental design was Split split plot with three replications. Main plots were assigned to preceding crops (the three rice varieties), sub plots to intermediate crops and sub-sub plots to three nitrogen rates. The sub-sub plot size was 21 m^{2} (3×7 m).

All agronomic practices for transplanting rice crop were followed as recommended. Rice was harvested on 10 and 8 September in 2015 and 2016 seasons.

Berseem (*Trifolium alexandrinum* L.) monocut Fahl and maize (*Zea mays* L.) as fodder was sown separately on 20 and 18 September in 2015 and 2016 seasons after rice crop. Cultural practices were applied according to recommendations of each crop. The cut date of berseem and maize was on 24 and 22 November in 2015 and 2016, respectively.

Sowing of wheat (*Triticum aestivum* L.) took place after intermediate crops (berseem, maize and fallow) on 3 December in 2015 and 29 November in 2016 season. Seeds of wheat cv. Giza 171 were broadcasting at a rate of 70 kg/fed.. The nitrogen fertilizer was applied into two equal additions before first and second irrigation. The experimental soil was fertilized with 100 kg calcium superphosphate (15.5% P_2O_5) per feddan during the soil preparation to sown wheat. At harvest, plant height and some yield attributes of wheat were measured. The total weight of both grain and straw yield was determined in each plot from the central area of 8 m^2 (2 X 4 m) and adjusted to tons per fedan.

Statistical analysis of the data was carried out as described by Gomez *et al*. (1984). Duncan's Multiple Range Test (Duncan, 1955) was used to compare treatment means. All statistical analysis was performed using CoStat software package.

RESULTS

Plant height:

Data in Table 1 showed that heights of wheat plants at harvest as affected by cropping system (preceding and intermediate crops) and nitrogen rates in both seasons. Rice cultivars as preceding crop had no significant effect on plant height of wheat.

Table 1. Plant height and spikes number m^{-2} and spike length of wheat as affected by cropping system (preceding and intermediate crop) and nitrogen rate in 2015/16 and 2016/17 seasons.

Factor	Plant height (cm)		Spikes (No m^{-2})		Spike length (cm)	
	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
Rice cultivars (R)						
Giza179	99.2	100.2	377	384.9	12.5	12.7
Sakha101	99.9	100.19	379	383	12.5	12.6
Sakha106	99.5	100.19	377	382.8	12.5	12.7
F test	NS	NS	NS	NS	NS	NS
Intermediate crop (I)						
Maize	98 b	99.33 b	368 b	372 b	12.0 b	12.2 b
Berseem	102.5 a	103.7 a	391 a	398 a	13.5 a	13.6 a
Fallow land	98.1 b	99 b	374 b	381 b	12.0 b	12.2 b
F test	**	**	**	**	**	**
Kg N fed^{-1} (N)						
50	93 c	93.96 c	327 c	333 c	11.5 c	11.7 c
75	99.4 b	100.48 b	376 b	379 b	12.5 b	12.7 b
100	106.1 a	107.59 a	430 a	439 a	13.5 a	13.6 a
F test	**	**	**	**	**	**
Interaction						
R x I	*	*	*	*	*	*
R x N	**	**	**	**	*	**
I x N	**	*	*	*	*	*
R x I x N	**	*	**	*	*	*

Intermediate crops exerted a significant effect on plant height of wheat. Wheat plants grown after berseem Fahl as a intermediate crop were taller than those grown after fallow or maize in both seasons. Increment in plant height of wheat by berseem followed wheat may be attributed to the legume fix nitrogen from the atmosphere due to root nodule bacteria and concentrate and activate phosphorus and potassium in soil. Wheat was cultivated after maize gave the shortest plant height because both crops are exhausted to the soil fertility. These promoting effects of legume-wheat sequences were reported by Ouda *et al*. (2017); Singh *et al*. (2008) and Usadadiya *et al*. (2014). Increasing nitrogen rate from 50 to 100 kg/feddan (fed) substantially increased plant height in both seasons. The rate of 100 kg N/fed produced the tallest wheat plants, while the rate of 50 kg N/fed produced the shortest ones. Such result is in harmony with that obtained by Hussain *et al*. (2006), Noureldin *et al*. (2013) and Mandic *et al*. (2015).

Plant height of wheat was markedly influenced by the interactions among all studied factors.

Yield attributes:

Data in Tables 1 and 2 show that rice cultivars as preceding crop had no significant effect on spikes number m^{-2}, spike length, spike weight and grains number $spike^{1}$, 1000-grain weight, grain yield, straw yield and harvest index of wheat in both seasons.

All the mentioned traits of wheat were substantially affected by intermediate crops. Wheat plants that followed berseem exceeded those followed fallow or maize as preceding crop in spikes number m^{-2}, spike length, spike weight, grains number $spike^{-1}$. Increment in yield attributes of wheat by berseem followed wheat treatment may be attributed to the legume fix nitrogen from the atmosphere due to root nodule bacteria and concentrate and activate phosphorus and potassium in soil. Data in Table 2 show that 1000-grain weight was the lowest value on berseem-wheat sequence. The reduction in 1000-grain weight at berseem-wheat sequence may be due to the legume fix nitrogen, which increased nitrogen content in plant, which may be resulted in a shortage of carbohydrate supplied per grain and in turne it is directly caused by an excessive number of grains. Hamd-Alla *et al*. (2015) found that maize-wheat sequence produced low productivity of wheat. Sharma and Behera (2009) indicated that wheat crop showed better growth in terms of produced more tillers and spikes m^{-2} following summer legumes than fallow. Previous research (Ouda *et al*., 2017; Singh *et al*., 2003) stated that legume crop rotation improved wheat yield.

Table 2. Spike weight, grains (no/spike) and 1000-grain weight(g) of wheat at harvest as affected by cropping system (preceding and intermediate crop) and nitrogen rate in 2015/16 and 2016/17 seasons.

Factor	Spike weight (g)		Grains (no/spike)		1000-grain weight(g)	
	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
Rice cultivars (R)						
Giza179	3.02	3.1	57.9	59.0	51.96	54.44
Sakha101	3.04	3.1	58.3	57.7	52.56	54.44
Sakha106	2.98	3.1	58.3	59.5	51.59	54.44
F test	NS	NS	NS	NS	NS	ns
Intermediate crop (I)						
Maize	2.91 b	3 b	54.0 b	55.5 b	54.22 a	54.52 a
Berseem	3.21 a	3.3 a	66.0 a	64.8 a	48 b	49.67 b
Fallow land	2.91 b	3 b	54.5 b	56.0 b	53.89 a	55.11 a
F test	**	**	**	**	**	**
Kg N fed^{-1} (N)						
50	2.83 b	3 b	48.7 c	48.5 c	52.04 b	54.63 a
75	3.43 a	3.5 a	57.3 b	58.6 b	53.59 a	52.49 b
100	2.78 b	2.9 b	68.4 a	69.1 a	50.48 c	52.18 b
F test	**	**	**	**	**	*
Interaction						
R x I	*	*	**	*	*	*
R x N	*	*	*	*	*	*
I x N	*	*	*	*	*	*
R x I x N	*	*	**	*	*	*

Spikes number m^{-2}, spike length and grains number $spike^{-1}$ were significantly increased when wheat plants received 100 kg N/fed compared with those received 50 or 75 kg N/fed (Table 1 and 2). However, wheat plants received 75 kg N fed^{-1} significantly exceeded those received low or high N rates in spike weight, grain yield and harvest index. Application of the high nitrogen rate (100 kg N fed^{-1}) resulted in a decrease in 1000-grain weight of wheat compared with the other two nitrogen rates. The effect of 50 and 75 kg N fed^{-1} on 1000-grain weight was inconsistent in both seasons. The heaviest 1000-grain weight was obtained from application of 75 and 50 kg N fed^{-1} in the first and second seasons, respectively. The reduction in 1000-grain weight at high N rate may be due to increase nitrogen content in plant, which may be resulted in a shortage of carbohydrate supplied per grain and in turne it is directly caused by an excessive number of grains produced by high N fertilization.

The increase in yield attributes by increasing nitrogen rate reflects the important role of nitrogen as an essential constituent of all proteins and it is concerned in the production of new living stuff and thus in all growth and reproduction. A positive association between nitrogen fertilization and wheat yield attributes has been reported by (Gharib *et al*., 2016; Hafez and Gharib, 2016; Mandic *et al*., 2015; Satyanarayana *et al*., 2017). All interactions had a significant effect on yield attributes of wheat in the two seasons are presented in Table 1 and 2.

Grain and straw yields:

Data in Table 3 illustrated that grain and straw yields as well as harvest index of wheat did not influence by rice cultivars as preceding crop in both seasons.

Table 3. Grain yield, straw yield and harvest index of wheat as affected by cropping system (preceding and intermediate crop) and nitrogen rate in 2015/16 and 2016/17 seasons.

Factor	Grain yield (t/fed.)		Straw yield (t/fed.)		Harvest index	
	2015 /16	2016 /17	2015 /16	2016 /17	2015 /16	2016 /17
Rice cultivars (R):						
Giza179	3.03	2.76	3.37	3.36	0.48	0.48
Sakha101	3.05	2.80	3.36	3.35	0.48	0.48
Sakha106	3.02	2.89	3.36	3.46	0.48	0.47
F test	NS	NS	NS	NS	NS	NS
Intermediate crop (I)						
Maize	2.89 b	2.66 b	3.32 b	3.31 b	0.48	0.48
Berseem	3.20 a	2.99 a	3.46 a	3.55 a	0.47	0.47
Fallow land	3.00 b	2.79 b	3.31 b	3.3 b	0.48	0.48
F test	*	*	**	**	NS	NS
Kg N fed^{-1} (N)						
50	2.7 c	2.44 c	3.05 c	3.14 b	0.46 b	0.46 b
75	3.37a	3.12 a	3.21 b	3.21 b	0.54 a	0.54 a
100	3.01 b	2.88 b	3.83 a	3.82 a	0.43 c	0.43 c
F test	**	**	**	**	**	**
Interaction						
R x I	NS	NS	*	NS	NS	NS
R x N	NS	NS	*	*	*	*
I x N	*	*	*	*	*	*
R x I x N	NS	NS	*	*	*	**

Intermediate crop significantly influenced grain and straw yield of wheat in the both seasons. Wheat sown after berseem outyielded those sown after maize or fallow in grain and straw yields in the two seasons. There were no significant difference in grain and straw yields of wheat at fallow or maize as a intermediate crops.

The berseem-wheat gave the highest grain and straw yield. The maize-wheat did not differ from fallow-wheat in these respects. More grain yield by the berseem as intermediate crop is attributed to more fertile tillers (spikes) per m^2, grains number $spike^{-1}$ and spike length. These results are in accordance with those reported by Singh *et al*. (2003), Singh *et al*. (2008), Usadadiya *et al*. (2014) and Ouda *et al*. (2017).

Straw yield of wheat was significantly increased by each increment of applied nitrogen. Adding 75 N/fed resulted in a substantial increase in grain yield and harvest index of wheat compared with adding 50 or 100 kg N/fed. This may be due to the luxurious vegetative growth because of immediate nitrogen availability and its quick uptake in root zone of more nutrients in the soil. These results are supported by the previous findings of Hafez and Gharib (2016); Mandic *et al*. (2015); Satyanarayana *et al*. (2017) and White *et al*. (2017).

The interaction (intermediate crop X nitrogen levels) effect was significant on grain yield. At berseem – wheat sequence system, the grain yield/fed was recorded the highest mean value at the rate of 75 and 100 kg N/fed did not differ from that at 50 kg N/fed (Table 4).

Table 4. Grain yield of wheat as affected by the interaction between nitrogen levels and intermediate crop in 2015/16 and 2016/17 seasons

Kg N fed^{-1}	Intermediate crop		
	Maize	Berseem	Fallow land
2015-16 season			
50	2.47 d	3.03 abc	2.61 cd
75	3.29 b	3.47 a	3.36 ab
100	2.91 bcd	3.10 ab	3.02 abc
2016-17 season			
50	2.19 b	2.81 a	3.32 b
75	3.04 a	3.18 a	3.14 a
100	2.76 a	2.98 a	2.89 a

REFERENCES

Black, C.; Evans, D.; White, J.; Ensminger, L. and Clark, F. (1965). Methods of soil analysis: Part 2. Chemical and microbial properties. *Agron. Monogr* 9.

Duncan, D. B. (1955). Multiple range and multiple F tests. *Biometrics* 11, 1-42.

Gharib, H., Hafez, E., and El Sabagh, A. (2016). Optimized Potential of Utilization Efficiency and Productivity in Wheat by Integrated Chemical Nitrogen Fertilization and Stimulative Compounds. *Cercetari Agronomice in Moldova* 49, 5-20.

Gomez, K. A., Gomez, K. A., and Gomez, A. A. (1984). "Statistical procedures for agricultural research," John Wiley & Sons.

Hafez, E., and Gharib, H. (2016). Effect of exogenous application of ascorbic acid on physiological and biochemical characteristics of wheat under water stress. *International Journal of Plant Production* 10, 579-596.

Hamd-Alla, W. A., Shalaby, E. M., Dawood, R. A., and Zohry, A. A. (2015). Effect of crop sequence and nitrogen fertilization on productivity of wheat. *Elixir International Journal of Agriculture*, 36215-36222.

Hussain, I., Khan, M. A., and Khan, E. A. (2006). Bread wheat varieties as influenced by different nitrogen levels. *Journal of Zhejiang University SCIENCE B* 7, 70-78.

Khalifa, A. A. B. A. (2009). Physiological evaluation of some hybrid rice varieties under different sowing dates. *Australian Journal of Crop Science* 3, 178-183.

Khalifa, A. A. A., ELkhoby, W., and Okasha, E. (2014). Effect of sowing dates and seed rates on some rice cultivars. *African Journal of Agricultural Research* 9, 196-201.

Mandic, V., Krnjaja, V., Tomic, Z., Bijelic, Z., Simic, A., Ruzic Muslic, D., and Gogic, M. (2015). Nitrogen fertilizer influence on wheat yield and use efficiency under different environmental conditions. *Chilean journal of agricultural research* 75, 92-97.

Noureldin, N. A., Saudy, H., Ashmawy, F., and Saed, H. (2013). Grain yield response index of bread wheat cultivars as influenced by nitrogen levels. *Annals of Agricultural Sciences* 58, 147-152.

Ouda, S. A. E.-F., Zohry, A. E.-H. A., Hamd-Alla, W. A., and Shalaby, E.-S. (2017). Evaluation of different crop sequences for wheat and maize in sandy soil. *Acta agriculturae Slovenica* 109, 383-392.

Rockström, J., Williams, J., Daily, G., Noble, A., Matthews, N., Gordon, L., Wetterstrand, H., DeClerck, F., Shah, M., and Steduto, P. (2017). Sustainable intensification of agriculture for human prosperity and global sustainability. *Ambio* 46, 4-17.

Satyanarayana, M., Reddy, A. P. K., Bhatt, P. S., Reddy, S. N., and Padmaja, J. (2017). Effect of Different Varieties and Levels of Nitrogen on Post-Harvest Parameters of Wheat (Triticum aestivum L.). *Int. J. Pure App. Biosci* 5, 1645-1652.

Sharma, A. R., and Behera, U. K. (2009). Nitrogen contribution through Sesbania green manure and dual-purpose legumes in maize–wheat cropping system: agronomic and economic considerations. *Plant and Soil* 325, 289-304.

Singh, J., Singh, K., Yadav, S., and Yadav, J. (2003). Effect of preceding crops and fertility levels on wheat (Triticum aestivum) in light-textured soil. *Indian Journal of Agronomy* 48, 86-88.

Singh, R., Singh, B., and Patidar, M. (2008). Effect of preceding crops and nutrient management on productivity of wheat (Triticum aestivum)-based cropping system in arid region. *Indian Journal of Agronomy (India)*.

Usadadiya, V. P., Patel, R. H., and Hirapara, B. V. (2014). Effect of preceding crops and nutrient management on growth, productivity and quality of wheat in irrigated conditions. *International Journal of Agriculture Innovations and Research* 2, 463-465.

White, B., Tubana, B. S., Babu, T., Mascagni, H., Agostinho, F., Datnoff, L. E., and Harrison, S. (2017). Effect of Silicate Slag Application on Wheat Grown Under Two Nitrogen Rates. *Plants* 6, 47.

تقييم بعض التعاقبات المحصولية و معدلات السماد النتروجينى على إنتاجية القمح

صبحى غريب رزق سرور[1] ، سحر على محمود شريف[2] و نعمه محمد قدرى ميلاد[2]

[1]قسم المحاصيل – كلية الزراعه – جامعه كفر الشيخ- مصر.

[2]قسم بحوث التكثيف المحصولى – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية- مصر.

أجريت تجربتان حقليتان فى أرض طينية بالمزرعة البحثية لمحطة البحوث الزراعية بسخا – كفر الشيخ، فى موسمى 2015-2016 و 2106-2017 ، بهدف إستغلال الفترة مابين حصاد الأرز المبكر والميعاد المناسب لزراعة القمح بزراعة محصول بينى لزيادة العائد الإقتصادى. وتمت دراسة إستجابة نمو ومحصول صنف القمح جيزة 171 للتعاقبات المحصولية ومستويات السماد النيتروجينى. وشملت كل تجربة ثلاثة أصناف من الأرز (سخا 101 و 106 سخا والجيزه 179) كمحصول سابق والمحاصيل البينية بعد حصاد الأرز وقبل زراعة القمح وهى محاصيلين علف وحيدة الحشة (برسيم فحل وذرة شامية) الى جانب أرض خالية بدون زراعة، وتسميد القمح بثلاثة معدلات من السماد النيتروجينى (50، 75 و 100 كجم نيتروجين للفدان). وأستخدم فى تنفيذ التجارب تصميم القطع المنشقة مرتين ذو ثلاث مكررات. حيث وزعت اصناف الارز كمحصول سابق في القطع الرئيسية والمحاصيل البينية (برسيم فحل- الذرة الشامية – بور) في القطع الشقية الأولى و معدلات النتروجين في القطع الشقية الثانية. لم تؤثر أصناف ألأرز كمحصول سابق معنويا على إرتفاع النبات, وعدد السنابل/ م^2 ، طول السنبلة ، وزن السنبلة، وعدد الحبوب/السنبلة، ووزن 1000-حبة، ومحصول الحبوب ، ومحصول القش، ودليل الحصاد للقمح فى كلا الموسمين. أثر المحصول البينى معنويا على جميع صفات القمح السابق ذكرها فيما عدا دليل الحصاد . تفوقت نباتات القمح المنزرعة بعد برسيم فحل في إرتفاع النبات، عدد سنابل/ م^2 ، طول السنبلة ، وزن السنبلة و عدد الحبوب بالسنبلة ومحصول الحبوب ، ومحصول القش بالمقارنة المنزرعة بعد ذرة شامية. وكان العكس صحيح فى وزن 1000– حبة. لم يختلف التعاقب المحصولى ذرة شامية- قمح أو بور-قمح معنويا فى محصول الحبوب و القش للقمح. أدت زيادة معدل السماد النيتروجينى من 50 الى 100 كجم نيتروجين للفدان الى زيادة تدريجية فى إرتفاع النبات، وعدد سنابل/ م^2 ، وطول السنبلة ، وعدد الحبوب بالسنبلة ، ومحصول القش فى القمح فى كلا الموسمين. أدت اضافة السماد النيتروجينى بالمعدل العالى 100كجم ن/فدان الى إنخفاض وزن 1000– حبة بالمقارنة بالمستويين المنخفضين. إدى إستخدام معدل النيتروجين الموصى به (75 كجم نيتروجين للفدان) فى القمح الى الحصول على أعلى وزن للسنبلة ، ومحصول الحبوب ، ومحصول القش، ودليل الحصاد بالمقارنة بالمعدلين الأخرين.أثر التفاعل بين المحصول البينى السابقة لمحصول القمح (برسيم فحل- الذرة الشامية – بور) ومعدل النيتروجين معنويا على محصول الحبوب للقمح. سجلت اعلى قيمة لمحصول حبوب القمح بعد التعاقب المحصولى برسيم- قمح و معدل التسميد 75 او 100 كجم ن/فدان مع عدم وجود اختلاف معنوى مع معدل تسميد 50 كجم ن/فدان. ويستنتج من النتائج أنه عند زراعة القمح بعد أرز يمكن زراعة البرسيم الفحل كمحصول بينى قبل زراعة القمح مع تسميدة بمعدل 50 كجم نيتروجين/فدان لتعظيم انتاجية محصول القمح بمحافظة كفرالشيخ. وبذلك يمكن توفير 50 كجم ن للفدان باستخدام البرسيم الفحل كمحصول بينى بدون نقص فى المحصول بالإضافة الى الحصول على علف أخضر يستخدم كغذاء للحيوانات مما يزيد من الثروة الحيوانية.