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Effect of planting date and nitrogen fertilizer on two varieties (inner and outer) of spinach

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ABSTRACT

In order to study the effect of planting date and nitrogen fertilizer on yield and yield components of two varieties of spinach, an experimental in split-split plot design with three replication in spring, 2011 year on a farm in the city Friedan was performed. Main factors include planting date (20 and 30 April and 9 and 19 May) and nitrogen fertilizer (75 and 150 kg/ ha) as sub-factor and cultivars (Yazdabad and Vierflay) was considered as sub-sub factor. Traits were measured number of day to 50% flowering, days to maturity date, number of seeds per boll, 1000 seed weight (TSW), total plant weight and yield. There was a significant effect of planting date on all of the traits and nitrogen fertilizer levels had significant effect on the number of seed per boll and TSW. Effect of cultivar levels on all traits except days to maturity had significant effect. In addition, interaction effect between nitrogen and planting date had significant effect on all traits except days to 50% flowering and days to maturity. Interaction effect of planting date and cultivar on all traits had significant effect except days to 50% flowering and days to maturity. Interaction effect on planting date, cultivar, and nitrogen on all traits except days to 50% flowering had significant effect. The highest amount of TSW was belonging to fertilizer control level at 30 April and Vierflay cultivar. The highest number of days until 50% flowering (56 days), days to maturity equal to 92 days and the highest TSW, 12 grams and most of the total weight of the plant was 7 grams. In addition, the highest biomass yield was equal to 5 kilograms. Results showed that in Faridan region planting date of 30 April and consuming 75 kg/ha, nitrogen cultivar Yazdabad recommended for spinach planting.

Key words: spinach, nitrate accumulation, planting date

INTRODUCTION

The most and important human foods are vegetables. Vegetables have large amounts of minerals and vitamin that there are not enough in other foods and vegetables, which can help and facilitate to the act of digestion [15]. Spinach with scientific name, *Spinacia oleracea*, is one of the important vegetables that its leaves and thin stems consume into fresh [2, 1]. Spinach in the eyes of vitamin B₃ is rich; water in spinach is rich of minerals, as a blood purifier, and in treatment of rheumatism, gout, and asthma is useful. Also is useful for arthritis and gallstones [7, 15]. Today daily consuming of vegetables recommend therefore we must sure about its healthy and one of the criterions of

health of vegetables is non-existence of nitrate. Nitrogen in order to soil fertility is essential but in case of using, a lot can cause danger for health of human [3].

Iran is located in arid and semiarid regions with low organic matter content and most plants have deficient in nitrogen. The most important way to provide the nitrogen required is using of nitrogen fertilizers [12, 13].

Zarei (1994) in his study about the accumulation of nitrate in spinach and lettuce showed that nitrate accumulation in the plant respectively blade flag >petioles> stems. There was different between the accumulations of nitrate in morning and evening.

Lorenzo (1978) done a research on nitrate accumulation in operational parts of vegetables, the Results showed that the amount of nitrate in different vegetables have different of nitrate accumulation and various organs in the eyes of nitrate accumulation showed difference. The highest nitrate accumulation in spinach accumulated in petioles and blades will accumulate less than petiole [9]. The results of Rahmani (1385) showed that nitrate concentrations measured in vegetables is respectively: spinach <Leek <Parsley <club <mint.

In addition, different planting dates on obtainable yield are effective and planting date led to highest yield beside other planting date [8].

In appropriate and unbalanced consuming of nitrate fertilizer led to increase nitrate in soil, water, and plant on the other hand entrance nitrate in food chain has serious problems.

Considering in need of study this field and to gain the maximum yield and minimum nitrate concentration this experiment in order to study the effect planting date and nitrogen fertilizer on two varieties of spinach was done in Daran region.

MATERIALS AND METHODS

The experiments in 2011 year in agricultural conservatory located in Daran City in Isfahan Province with 32^o, 59' norths Latitude, and 50^o, 27' attitude east was administered. Field elevation was 2355 meters above sea level.

The experimental design was a split-split plot with three replications. Main factor included four planting date (20, 30 April and 9, 19 May) sub-factor included three levels of nitrogen fertilizer (0, 75 and 150 kg/ ha urea, urea contains 46% pure nitrogen) and sub-sub factor included two varieties. Soil texture was loam and soil pH 7.3 and the amount of organic matter in soil was 1.12, the size of the experimental unit was 9 square meters. Seeds were planted in rows with a distance of 20 cm plant spacing on each row was 10 cm. After planting first irrigation was done, second irrigation was performed within 5 days after the first irrigation. To prevent nitrogen leaching during plant growth, nitrogen determined for each experiment was performed twice at regular intervals.

Traits were measured number of day to 50% flowering, days to maturity date, number of seeds per boll, 1000 seed weight(TSW), total plant weight and yield. MSTATC computer software was used for analyzing the data variance and comparing their mean (by Duncan Test), and the diagrams were drawn by Excel software.

RESULTS AND DISCUSSION

The number of days to 50% flowering

The effect of planting date was significant at the one percent level. Maximum number of days to 50% flowering related to the first planting date (20 April) and cultivar Yazdabad and fertilizer level 70 and 150 kg/ ha. Minimum number of days to 50% flowering related to the third planting date (9 May), Yazdabad variety and fertilizer levels in control, 75,150 kg /ha and the third planting date (9 May), Vierflay variety and fertilizer levels in control, 75,150 kg /ha measure up to 50 days.

The number of days to maturity

Different planting dates levels, the interaction of cultivar, nitrogen, planting date at 1% level probability on this trait was significant. Well the most handled planting date related to first the first planting date (20 April) Yazdabad cultivar and fertilizer level control and 75 and 150kg/ha. And the lowest related to the third planting (9 May)

Yazdabad cultivar and fertilizer level control and 75 and 150kg/ha and fourth planting date (19 May), Vierflay cultivar and fertilizer level control and 75 and 150kg/ha with amount of 85.6 days. Bang et al (1997) reported that nitrogen fertilizer causes increasing in completely growing period of sunflower.

The number of seeds per boll

The effect of different levels of planting dates, nitrogen, cultivar, and interaction between nitrogen and planting date and interaction of cultivar, planting date and nitrogen at 1% level probability was significant. Simple effect of cultivar at 5% level probability was significant. The highest number of seeds related to the first planting date (20 April) and Vierflay cultivar and fertilizer level 150 kg /ha (5 numbers). The lowest number related to the fourth planting date (19 May) and Yazdabad variety and fertilizer level control (0). That is conform to the results of Asadi(2001) that said delayed planting date caused reduce in number of seeds per head and seed yield were eventually reduced.

1000 seed Weight (TSW)

The effect of planting dates and different levels of nitrogen and variety and interaction of nitrogen and planting date and interaction cultivar and planting date and interaction between variety and nitrogen and the interaction of cultivar and nitrogen and planting date at 1% level probability was significant. The highest TSW related to the second planting date (30 April) Vierflay cultivar and fertilizer level control amount of 12.9 grams and lowest related to the fourth planting date (19 May) Yazdabad cultivar and fertilizer level 75 kg/ ha with 4.1 gram Therefore, with the delay in planting decreased seed weight the results is according to Salardini (1987).

Total weight of the plant

The results of variance analysis showed that the effect of deferent levels of planting date, cultivar and interaction effect of nitrogen and planting date and interaction between cultivar, planting date and interaction between cultivar, nitrogen and interaction effect of cultivar, planting date and nitrogen levels at 1% level probability was significant. The second planting date (30 April) and Vierflay cultivar and fertilizer level control (0) with 6.6 grams had the highest total weight and the third planting date (9 May) Yazdabad variety and fertilizer level 75 kg/ha with 1.7 grams had the lowest total weight. This results with results of Behtash et al (2001) is consistent they stated in their study that the effect of nitrogen on the dry weight of the plant had positive effect.

Biomass yield

Effect of different planting dates, variety, and interaction of nitrogen and planting date and interaction of cultivar and planting date and interaction effect of cultivar, nitrogen and interaction effect of variety, nitrogen, and planting date was significant at 1% level probability. The maximum yield obtained from the fourth planting date (19 May), Yazdabad variety and fertilizer control level with 5.05 grams. The lowest yield obtained from the fourth planting date (19 May), Veirflay cultivar and fertilizer level with 75 kg/ha. Esfandiary et al (2007) reported that with addition of nitrogen, yield of spinach from 20.2 to 41.2 kg/ha was increased. Lyob et al (1954) stated that the delay in planting date causes to meet the plant reproductive growth stages with hot weather in early summer and water stress and thus may significantly reduce yield.

CONCLUSION

Nitrogen directly affects on accumulated dry matter that the results of this experiment indicate that increasing nitrogen biomass yield and total weight increased. The result of Qarneh (1386) studies on the interaction of planting date, and nitrogen in spinach showed the highest concentration of nitrate is in spring planting. With the argument of the analyzed data can be expressed to exploit of maximum advantage is better to planning in the second half of April and for oral direction uses domestic varieties Yazdabad also for reduces the concentration of nitrate should be reduce using nitrogen fertilizers. In addition, nitrogen fertilizer should consume based on the real needs of plant and the amount of organic matter and nitrogen of the soil before planting the plants should be tested.

With regard to the consumption of vegetables nitrate contaminated by human can cause blood problems. For planting vegetables in Daran city consume 75kg/ha, nitrogen is recommended.

REFERENCES

- [1] Asadi, M. .2001. Flor Iran. No. 38, spinach family. Forest Research Institute.

- [2] Aghah, S. **2010**. Fruits and herbal therapy. Publications Nashr e Saman. Pp. 164-167.
- [3] Behtash, F and S, the Messiah. **2001**. *Iranian Journal* Volume 2, numbers 3 and 4, pages 155 to 160.
- [4] Bange, M.P., hammer, g.J., and Rickert, K.G. **1997**. *crop Sci* .37:1208-1214.
- [5] Cataldo, D.A., L.E. Schrader & V.L. Yongs. **1975**. *Commu. Soil Sci. plant anal.* 6:71-80.
- [6] Esfandiari, M., AS, Chraty. N., and the Amelie G, Ganizedeh. **2007** Effect of dung and nitrate on yield and nitrate concentration in Spinach after rice harvest. Islamic Azad University, Tehran Science Research.
- [7] Heidari, A. **2006**. Healing power of fruits and vegetables. Publications Shir Mohammadi. Pp. 41.
- [8] Khajeh, M., **2004**. Fundamental Principles of Agriculture, Isfahan Jahad deneshgahi . Page 313.
- [9] Lorenzo, A. **1978**. Potential nitrate levels in edible plants parts. in: D.R. Nielsen et al. Nitrogen in environment. Vol.2, soil- P- nitrogen relationships, Academic press, New York, U.S.A. 210-220.
- [10] Lueb s, R.E., yer manos , D.M., lag. A.E. and Burge. w.B. **1954**. *Agron.j*:7:122-124.
- [11] Qarneh Asadi, H.. And Hasandokht, M. R. **2007**. *Journal of Agricultural Science*. Volume 38, Number 2. Pages 265-270.
- [12] Rahmani, H., **2006**, Evaluation of nitrate in soil, water and crop lands Braa region.
- [13] Rahmati, F. **1994**. Effects of planting date on yield quality in two varieties of sesame, spring-summer crop. Master's thesis. University. P 131.
- [14] Salardini, A. **1987**. Soil fertility. Tehran University Press. N., of 11 Spring 1380 Environmental Science.
- [15] Sohrabi, M. **2009**. Miracle of healing plants. Arman Rosh Publication. Pp. 61-62.
- [16] Zarei. CE. **1994**. Study the accumulation of nitrate in lettuce and spinach vegetables with nitrogen fertilizers, Master's thesis, Tarbiat Modares University, Tehran, Iran.