



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2021; 10(11): 30-32

© 2021 TPI

www.thepharmajournal.com

Received: 10-07-2021

Accepted: 14-08-2021

Shubhramshu Singh

Department of Agronomy,
Acharya Narendra Deva
University of Agriculture and
Technology, Kumarganj
Ayodhya, Uttar Pradesh, India

Anil Kumar Singh

Associate Professors and Head,
Department of Agronomy,
Acharya Narendra Deva
University of Agriculture and
Technology, Kumarganj
Ayodhya, Uttar Pradesh, India

Devesh Pathak

Department of Soil Science and
Agricultural Chemistry, Acharya
Narendra Deva University of
Agriculture and Technology,
Kumarganj Ayodhya, Uttar
Pradesh, India

Shubhendu Singh

Department of Agronomy,
Acharya Narendra Deva
University of Agriculture and
Technology, Kumarganj
Ayodhya, Uttar Pradesh, India

Pooja Yadav

Department of Agronomy,
Acharya Narendra Deva
University of Agriculture and
Technology, Kumarganj
Ayodhya, Uttar Pradesh, India

Corresponding Author:

Shubhramshu Singh

Department of Agronomy,
Acharya Narendra Deva
University of Agriculture and
Technology, Kumarganj
Ayodhya, Uttar Pradesh, India

Effect of different varieties of potato on irrigation scheduling in terms of growth and yields

Shubhramshu Singh, Anil Kumar Singh, Devesh Pathak, Shubhendu Singh and Pooja Yadav

Abstract

A field experiment was conducted on the topic entitled “Effect of different varieties of potato on irrigation scheduling in terms of growth and yields.” during the Rabi season of 2019-20 at Main Experiment Station, Vegetable Research Farm, A. N. D. University of Agriculture & Technology Kumarganj, Ayodhya. The treatment consisted of five potato varieties viz. K. Ashoka, K. Bahar, K. Neelkanth, K. Khyati, K. Sadabahar, and two irrigation scheduling viz. No Water Stress and Water Stress. The experiment was conducted in Factorial RBD and replicated three times. The soil of the experimental field was low in organic carbon (0.40%) and nitrogen (142.57 kg ha⁻¹), medium in available phosphorus (15.73 kg ha⁻¹), and high in potassium (242.23 kg ha⁻¹) with pH 8.3. The planting was done on 3rd November 2019. Among the various irrigation scheduling and potato varieties measure, Kufari Khyati irrigated with No Water Stress recorded higher in terms of growth and yields.

Keywords: Varieties of potato, irrigation scheduling, growth, plant height, number of haulm, tuber yield and yields

1. Introduction

The potato is a starchy tuber of the plant *Solanum tuberosum* and is a root vegetable native to the Americas, with the plant itself being a perennial in the nightshade family Solanaceae. Potatoes were introduced from the Americas to Europe in the second half of the 16th century by the Spanish. Now a days potatoes are a staple food in many parts of the world and an integral part of much of the world's food supply. As of 2014, potatoes were the world's 4th largest food crop after maize, wheat, and rice. A typical raw potato is 79% water, 17% carbohydrates (88% is starch), 2% protein, and contains negligible fat (see table) according to the United States Department of Agriculture. In a 100-gram (3 1/2-ounce) portion, raw potato provides 322 kilojoules (77 kilocalories) of food energy and is a rich source of Vitamin B6 and Vitamin C (23% and 24% of the Daily Value, respectively), with no other vitamins or minerals in significant amount (see table). The potato is rarely eaten raw because raw potato starch is poorly digested by humans. When a potato is baked, its contents of vitamin B6 and vitamin C decline notably, while there is little significant change in the amount of other nutrients. The cultivated area is about 2.7 million hectares irrigated by surface irrigation from total cultivated area of 3.9 million hectares according to data issued by Ministry of Agriculture, Egypt in 2013. Despite this progressive water shortage farmer continue to use surface irrigation. Poor management, uniformity and distribution of water have been cited as the most frequent problems of surface irrigation, resulting in waterlogging, salinization and less water use efficiency (AbouKheira, 2009) ^[1]. Potato is considered one of the main important vegetable ranks as manufacture and export crop among the different vegetable crops in Egypt. About 178 thousand hectares are only cultivated in spring and winter seasons. Total production of potato in Egypt is about four million tons per year.

Irrigation scheduling is defined as deciding when to irrigate and how much water to apply. Several types of irrigation scheduling have been documented. Martin *et al.* (1990) classified methods of irrigation scheduling as belonging to one of two broad groups: soil water balance computations, and soil and/or crop monitoring techniques. Deficit irrigation lowers yield due to reduced leaf area and/or reduced photosynthesis per unit leaf area. (Van Loon, 1981) ^[9] Water is the vital source for crop production and is the most limiting factor in Indian agriculture.

2. Materials and Method

A field experiment was conducted on the topic entitled "Effect of different varieties of potato on irrigation scheduling in terms of growth and yields." during the Rabi season of 2019-20 at Main Experiment Station, Vegetable Research Farm, A. N. D. University of Agriculture & Technology Kumarganj, Ayodhya. The treatment consisted of five potato varieties viz. K. Ashoka, K. Bahar, K. Neelkanth, K. Khyati, K. Sadabahar, and two irrigation scheduling viz. No Water Stress and Water Stress. The experiment was conducted in Factorial RBD and replicated three times. The soil of the experimental field was low in organic carbon (0.40%) and nitrogen (142.57 kg ha⁻¹), medium in available phosphorus (15.73 kg ha⁻¹), and high in potassium (242.23 kg ha⁻¹) with pH 8.3. The planting was done on 3rd November 2019.

3. Result and Discussion

3.1 Growth Characters

3.1.1 Initial plant emergence

Data pertaining to plant emergence in percent recorded at 30 Days After Planting (DAP), have been presented in Table 4.1 clearly indicated that the plant emergence percent did not influenced significantly due to varieties of potato and irrigation scheduling.

3.1.2 Plant height

Data pertaining to plant height recorded at 30 and 60 DAP as influenced by different experimental treatments have been presented in Table 1. A perusal of the data reveal that the irrigation scheduling and varieties of potato could produce variation on this attribute.

Varieties of potato influenced the plant height significantly at 30 and 60 DAP. Higher plant height at harvest 56.20 cm was recorded in K. Khyati which was at par with K. Sadabahar while significant over the rest of the varieties.

Critical analysis of data revealed that irrigation scheduling has no significant effect on plant height at 30 DAP. At later stage of plant growth, the higher plant height was recorded 46.40 cm and 51.26 cm at 60 DAP respectively was recorded with no moisture stress which was significantly superior over water stress.

Plant height at 60 was influenced significantly due to irrigation scheduling except 30 at DAP. Significantly higher value for plant height was recorded with I₁ (no water stress) irrigation scheduling in comparison to I₂ (water stress) Irrigation scheduling (Table 1). This may be due to optimum moisture which has boosted the vegetative growth. Similar findings have also been reported by Vanloon, 1981^[9] and Patel and Patel, 2001^[6].

Table 1: Initial Plant emergence and plant height at successive stage of potato as influenced by irrigation scheduling and varieties.

Treatments	Initial plant emergence(%) at 30 DAP	Plant height (cm)	
		30 DAP	60 DAP
Varieties			
K. Ashoka	92.10	20.85	42.90
K. Bahar	90.90	18.50	39.60
K. Neelkanth	92.50	19.00	46.85
K. Khyati	94.35	22.90	51.10
K. Sadabahar	90.00	17.60	39.60
S.Em+	2.59	0.56	1.02
CD at 5%	NS	1.68	3.03
Irrigation scheduling			
No Water Stress	92.14	19.86	46.40
Water Stress	91.80	19.48	41.62
S.Em+	2.24	0.49	0.88
CD at 5%	NS	NS	2.63

3.1.3 Number of leaves (m⁻¹)

Data pertaining to number of leaves m⁻¹ recorded at 30 and 60 DAP as influenced by irrigation scheduling and potato varieties have been presented in Table 2.

Critical analysis of results revealed that the potato varieties had significant effect on the number of leaves m⁻¹ at all the crop growth stages i.e. 30 and 60 DAP, significantly higher number of leaves were recorded in K. Khyati variety as compared to rest of varieties

However, significant difference in number of leaves was recorded with different potato varieties and higher number of

leaves m⁻¹ i.e. 134.00 and 360.00 at 30 and 60 DAP was recorded in with K. Khyati which was significantly higher than K. Ashoka, K. Bahar, K. Neelkanth and K. Sadabahar.

Irrigation scheduling brought significant effect on the number of leaves at 60 DAP. Significantly higher number of leaves m⁻¹ 331.60 at 60 DAP were recorded under no water stress which was superior over water stress (Table- 2).

It may be due to optimum supply of moisture which has boosted the vegetative growth. Optimum Irrigation has also produced more number of leaves. Similar findings have also been reported by Vanloon, 1984 and Patel and Patel, 2001^[6].

Table 2: Number of haulms and number of leaves of potato as influenced by irrigation scheduling and varieties

Treatments	Number of haulms (m ⁻¹)	
	30 DAP	60 DAP
Varieties		
K. Ashoka	13.50	22.75
K. Bahar	15	25
K. Neelkanth	16	27
K. Khyati	17.25	27.50
K. Sadabahar	15.25	25.75
SEm+	0.36	0.59
CD at 5%	1.08	1.77

Irrigation scheduling		
No Water Stress	15.90	26.60
Water Stress	15	25
S.Em+	0.31	0.51
CD at 5%	NS	1.53

3.2 Yield attributes and yield

3.2.1 Number of 0-25g grade tubers

Data pertaining to number of 0-25g grade tubers hill⁻¹ as affected by irrigation scheduling and potato varieties have been presented in Table 2.

There was significant difference in number of 0-25g grade tubers hill⁻¹ between different potato varieties. Higher number of 0-25g grade tubers 34.5 hill⁻¹ was recorded in K. Sadabahar which was at par with K. Bahar while significant over rest of the varieties of potato.

The number of 0-25g grade tubers hill⁻¹ was not affected significantly due to irrigation scheduling.

3.2.2 Number of 50-75g grade tubers

Data pertaining to number of 50-75g grade tubers hill⁻¹ as affected by irrigation scheduling and potato varieties have been presented in Table 2.

Significant differences in number of 50-75g grade tubers hill⁻¹ was recorded with various potato varieties K. Khyati. Higher number of 50-75g grade tubers (16 hill⁻¹) which was significantly superior over rest of the varieties.

The tuber with the number of 50-75g hill⁻¹ was influenced significant due to irrigation scheduling's. Higher number of 50-75g grade tubers hill⁻¹ was recorded under no water stress I₁ with 12 hill⁻¹ which was significantly superior over water stress I₂.

Table 3: Number of tuber (hill⁻¹) of potato as influenced by irrigation scheduling and varieties

Treatments	Number of tuber (hill ⁻¹)	
	(0-25g)	(50-75g)
Varieties		
K. Ashoka	22.00	8.00
K. Bahar	33.00	10.00
K. Neelkanth	30.50	12.50
K. Khyati	34.50	16.00
K. Sadabahar	18.00	9.50
S.Em+	0.79	0.25
CD at 5%	2.35	0.76
Irrigation scheduling		
No Water Stress	27.20	12.00
Water Stress	28.00	10.40
S.Em+	0.68	0.22
CD at 5%	NS	0.66

4. Tubers yield

Tuber yield (qha⁻¹) as influenced by various irrigation scheduling and potato varieties have been presented in Table 4.8 and graphically depicted in Fig. 4.13.

Result showed that the potato varieties significantly affects the tuber yield. Higher tuber yield 408.10 qha⁻¹ was recorded under potato variety V₄ (K. Khyati) which was significantly superior over rest of the potato varieties.

Results also showed significant difference in tuber yield among both irrigation scheduling. Irrigation scheduling no water stress (I₁) recorded significantly higher tuber yield 361.14 qha⁻¹ as compared to irrigation scheduling with water stress I₂ 310.6 qha⁻¹.

Table 3: Tuber yield (t ha⁻¹) of potato as influenced by irrigation scheduling and varieties

Treatments	Tuber yield (qha ⁻¹)
Varieties	
K. Ashoka	274.70
K. Bahar	311.70
K. Neelkanth	366.75
K. Khyati	408.10
K. Sadabahar	316.60
S.Em+	7.22
CD at 5%	21.46
Irrigation scheduling	
No Water Stress	361.14
Water Stress	310.6
S.Em+	6.25
CD at 5%	18.59

5. Conclusion

Among Different irrigation scheduling practices we recorded that the potato variety Khufari Khyati Irrigated with no water stress give highest production.

6. References

1. AbouKheira AA. Comparison among different Irrigation Systems for Deficit-Irrigated Corn in the Nile Valley. *Agricultural Engineering International: CIGR Journal*. 2009;14:1-25.
2. Amer KH, Abdellateif A, Samak Jerry L, Hatfield. Effect of irrigation method and non-uniformity of irrigation on potato performance and quality, *J Water Resource and Protection*. 2016;8:277-292.
3. Chandra S, Singh RD, Bisth JK. Water use and yield of potato under irrigation constrains, *Ann of Agricultural Res*. 2001;20(1):128-129.
4. Hassan AA, Sarkar AA, Ali HM, Karim N. Effect of deficit irrigation at different growth stages on the yield of potato, *Pakistan J Biological Sci*. 2002;5(2):128-134.
5. Jamal A, Ball MS, Samims TW. Comparison of Sprinkler, trickle and furrow irrigation efficiencies for more onion production, *Agric Water Manage*. 2001;46(3):253-266.
6. Patel JC, Patel LR. Effect of irrigation and nitrogen on yield attributes in Potato. *J Indian Potato Assoc* 2001;28(2/4):285-287.
7. Tripathi AK, Mishra RD. Criteria for scheduling to irrigation of potato, *J Indian Potato Assoc*. 1984;11(1/2):43-47
8. Singh N, Singh H. Irrigation-a cultural practice to control common scab of potato, *J Indian Potato Assoc*. 1981;8(1):35-36.
9. Van Loon CD. The effect of water stress on potato growth, development, and yield. *Am. Potato J*. 1981;58:51-69.
10. Yadav AC, Avtar S, Jagdeep B, Lal S. Effect of irrigation and plant spacing on the growth, yield and water use efficiency of potato CV. Kufri Sutlej. *Haryana J Hort. Sci*. 2003;32(1/2):138 140.