Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; SP2: 59-62

AP Bhagat
Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

VM Bhale
Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

BV Saoji
Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

KJ Kubde
Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

VK Kharche
Department of Soil Science and Agricultural Chemistry, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

PR Kadu
Department of Soil Science and Agricultural Chemistry, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

PN Patle
Department of Soil Science and Agricultural Chemistry, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

Correspondence
AP Bhagat
Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, (M. S.), India

Reciprocating preliminary effect on fodder maize as influenced by irrigation regimes and fertilizer levels grown in summer season

AP Bhagat, VM Bhale, BV Saoji, KJ Kubde, VK Kharche, PR Kadu and PN Patle

Abstract
A field experiment entitled "Response of fodder maize to irrigation regimes and fertilizer levels in summer season" was conducted at Research Farm, Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *Summer* season of 2017-18. The experiment was laid out in split plot design with four main plot and four sub plot treatments and three replications, in order to study the response of fodder maize to irrigation levels and fertilizer levels. The main plot treatments were : I1- Irrigation at 0.6 IW/CPE, I2- Irrigation at 0.8 IW/CPE, I3- Irrigation at 1.0 IW/CPE and I4- Irrigation at 1.2 IW/CPE and subplot treatments consisted of : F1-120:60:30 kg NPK ha-1, F2-120:60:30 kg NPK ha-1 + Vermicompost 5 t ha-1, F3 -180:90:60 kg NPK ha-1 and F4- 150:75:45 kg NPK ha-1. The gross plot size was 5.4m x 4.6 m and the net plot size was 4.5 m X 3.6 m. Sowing of the fodder maize was undertaken during 18th April, 2017. Sowing was done by dibbling method and the inter- cultivation practices were kept common as recommended. The final harvesting of green fodder was taken on 2nd July 2017. The experimental results revealed that the fodder maize performed best at 1.2 IW/CPE. All the growth attributes viz., plant height plant-1, number of functional leaves plant-1, leaf area plant-1 and dry matter weight plant-1 were observed to be the highest in irrigation provided at 1.2 IW/CPE, being at par with 1.0 IW/CPE in respect of all growth parameters except dry matter accumulation plant-1. Green fodder yield of maize was found to be the maximum at irrigation provided with 1.2 IW/CPE (55522 kg ha-1), being at par with irrigation at 1.0 IW/CPE (51120 kg ha-1). The irrigation levels at 0.6 IW/CPE recorded the highest water use efficiency of 7.25 kg ha-1mm-1. However, highest consumptive use of water 840 mm was recorded with irrigation levels at 1.2 IW/CPE. The fertilizer application with 180:90:60 kg NPK ha-1 recorded highest values for all the growth characters viz., plant height in cm, number of leaves plant-1, leaf area plant-1, dry matter accumulation plant-1. Significantly highest green fodder yield was recorded by fertilizer treatment 180:90:60 kg NPK ha-1 (47013 kg ha-1), being at par with fertilizer treatments 150:75:45 kg NPK ha-1 and 120:60:30 kg NPK ha-1+ Vermicompost 5 t ha-1.

Keywords: fodder, irrigation, vermicompost, parameters, consumptive, fertilizer.

Introduction
Maize or corn (*Zea mays* L.) is one of the most important cereal crops of the world used as food and feed. Although maize fodder has low protein content but it is relished by the animals due to being succulent and palatable (Ali *et al*., 2004). The maize fodder plays a vital role in increasing the productivity of the livestock and making this enterprise more profitable. The crop has an edge over cultivated fodder crops due to its adaptability and excellent fodder quality and usage in the form of silage. Since the nutrient turnover in soil plant system is considerably high under intensive cropping system, neither the chemical fertilizer alone plays an important role in forage production nor the organic/biological sources alone can achieve production sustainability. The green forage of maize is a valuable cattle food on account of its high albuminoidal and fat content, which is highly succulent, palatable and digestible with rich leafy growth. Being a C4 plant it has better efficiency in conversion of solar energy into chemical energy and therefore, maize has better potential as a source of energy, resulting into higher production of dry matter per unit area per unit time. It is a safe summer fodder with oxalic acid content within the limits.
Live stock rearing is a very important part of our rural economy not only for animal products, but also for draft power. India has the largest live stock population of 520 million heard which is about 15 per cent of the world's livestock. Whereas, India has only two per cent of the world's geographical area. This has put tremendous pressure on the availability of feed and fodder to livestock due to competing demands for food crops to meet the requirements ever increasing the population. The present feed and fodder resources of the country can meet

only 47 per cent of the requirements with a vast deficit of 61 and 22 per cent of green and dry fodder, respectively.
The important reasons for the extremely low productivity of Indian cattle due to lack of high productive breeds and poor nutrition. While considering the above problems, one can not over look the fact that the area under fodder crop i.e. 20.3 million hectors which is about 5.29 per cent of the total cultivable area is quite inadequate. There is big gap between available green fodder and its normal requirement. This gap is further widened during summer month (April- June) due to acute shortage of green forage material. As the area under fodder crops cannot be increased because of ever increasing demand for food grain and other cash crops which are more paying during normal seasons, i.e summer and minimize the acute shortage of green crops plays a vital role in improving the yield and quality of forage crop.
Among various forage crops used for green forage production, maize (*zea mays*) occupy a significant place. With possibility of growing maize round the year. It ranks first in forage production. Additionally, maize is known to be well adapted, high yielder and climatologically intermediate crop with supplemental irrigations in addition to its rain fed culture during autumn season. In view of the various advantages offered by maize forage interest in the cultivation is increasing. However, its management for forage production relating to selection of variety, their fertilizer and irrigation need coupled with production potential and nutritive value make it rather difficult to meet the demand of quality fodder.

Material and Methods
The Field experiment entitled **"**Response of fodder maize to irrigation regimes and fertilizer levels in summer season '' was conducted during the year 2017-18 in *summer* **season. The details of material and methods used during the course of investigation are as per described as below.** The experiment was conducted in the plot No. 66 of the experiment field of Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during of 2017. The site selected for conducting the experiment was fairly uniform and properly levelled.

Treatment details
Main plot: Irrigation levels (IW/CPE ratio)
11: 0.6
12: 0.8
13: 1.0
14: 1.2

Sub plot: Fertilizers
F1:120:60:30 kg NPK ha-1
F2:120:60:30 kg NPK ha-1 + vermicompost 5t ha-1
F3:180:90:60 kg NPK ha-1
F4:150:75:45 kg NPK ha-1

Emergence count and final plant stand at harvest
Emergence specifically depends upon the quantity of the reserve food supply available in the seed and the efficiency of food conversion to energy. Apart from this the soil physical status also plays an important role. While, for final plants stand, the soil chemical and physical status, and biological environment make provision for better plant growth and to maintain its optimum population. The data about the plant population 20 DAS and at harvest as influenced by various treatments are presented in table1. Mean emergence and final plant count at harvest were 185.86 and 182.64, respectively.

Effect of irrigation levels
Emergence count as well as the final count were found to be non-significant in respect of the irrigation levels.

Effect of fertilizer management
Emergence count as well as the final count were found to be non-significant in respect of the different fertilizer levels.

Interaction effect
Interaction effect of the treatments was found to be non-significant in respect of plant height at all stages of the crop growth.

Growth studies Plant height
The apical meristem is responsible for vertical growth, organ increase in length of a stem. These cells in the apical meristem undergo mitosis reflecting in increased plant height. For stimulation of plant growth hormones, supply of water and nutrients through the ideal root system becomes inevitable. Any imbalance between the resources of the soil and the plant needs causes variations in the plant height and ultimately in its overall growth. Availability of soil resources for the plant growth depends largely on the factors which influence the physical status of soil, apart from its chemical and biological circumstances. Hence, it becomes certain to observe the plant height at a periodical interval, so as to distinguish the treatment effects, if any. Data on plant height at various growth stages as influenced by different treatments presented in table 2. The mean plant height was increased progressively up to harvest. The rate of plant height increase in fodder maize was moderate in between 0 - 20 DAS and 20 – 40 DAS and rapid in between 40 DAS to harvest.

Effect of irrigation levels
The plant height was significantly influenced due to the scheduling of irrigation at all the stages of crop growth except at 20 DAS. At 40 DAS, significantly highest plant height (92.25 cm) was observed at 1.2 IW/CPE irrigation scheduling, over 0.8 and 0.6 IW/CPE irrigation regimes but it was found statistically at par with irrigation scheduling at 1.0 IW/CPE which recorded plant height of 88.50 cm. At harvest, the maximum plant height (244.50cm) was observed in case of irrigation with 1.2 IW/CPE, which was significantly superior over all other irrigation levels except irrigation provided at 1.0 IW/CPE with plant height of 230.58 cm. Lowest plant height was recorded at 0.6 IW/CPE (215 cm). Increase in plant height in higher irrigation levels might be due to optimum soil moisture availability favouring the nutrient uptake, resulting in better growth, synthesising activity and assimilation rate leading to increase in growth attributes. The irrigation scheduled at IW/CPE of 1.2 provided higher soil moisture availability due to which favourable conditions were developed for nutrient and water absorption resulting in higher plant height as compared to other levels i.e. scheduling irrigation through 0.6 IW/CPE and 0.8 IW/CPE. Similar finding was also reported by Singh *et al.* (1997) [7], Bharti *et al*. (2007) [1], and Shivakumar *et al*. (2011) [6].

Effect of fertilizer levels
The plant height was significantly influenced due to various treatments of nutrient management, at all stages of crop growth; except at 20 DAS, where all the plants might have

received the adequate fertilization at the initial crop growth stage. At 40 DAS, maximum plant height (83.25 cm) was observed in fertilizer treatment of 180:90:60 kg NPK ha^{-1}, being statistically similar with fertilizer levels of 150:75:45 kg NPK ha^{-1} and RDF+ Vermicompost 5 t ha^{-1}. However lowest plant height was observed with treatment where RDF was applied. The increase in plant height with increased levels of fertilizer levels might be due to enhanced synthesis of chlorophyll, induced cell division and cell expansion leading to stimulated cell elongation along the main axis, which resulted in increase in number and length of internodes and resultant increase in plant height. Similar results have also been reported by Hani Eltelib *et al*. (2006) [2], Joshi and Kuldeep Kumar (2007) and Safdar Ali *et al*. (2012) [5].

Interaction effect

Interaction effect of the treatments was found to be non-significant in respect of plant height at all stages of the crop growth.

Table 1: Emergence count and final plant stand at harvest of maize as influenced by various irrigation and fertilizer treatments.

Treatments	Initial plant count per net plot	Final plant count per net plot
A. Main plot (Irrigation regimes)		
I1-0.6 IW/CPE ratio	185.25	180.25
I2-0.8 IW/CPE ratio	185.58	179.58
I3-1.0 IW/CPE ratio	185.75	178.83
I4-1.2 IW/CPE ratio	185.66	180.91
SE (m) ±	0.27	0.24
CD at 5%	NS	NS
B. Sub plot		
F1-120:60:30 kg NPK ha-1	185.83	180.75
F2-RDF+Vermicompost 5tha-1	185.50	178.50
F3-180:90:60 kg NPK ha-1	185.58	179.75
F4-150:75:45 kg NPK ha-1	185.33	178.58
SE (m) ±	0.186	0.181
CD at 5%	NS	NS
Interaction (AxB)		
SE (m) ±	0.37	0.36
CD at 5%	NS	NS
General Mean	185.56	179.64

Table 2: Plant height (cm) of maize as influenced by various irrigation and fertilizer treatments.

Treatments	Plant height in cm		
	20DAS	40DAS	At harvest
A. Main plot (Irrigation regimes)			
I1-0.6 IW/CPE ratio	26.20	69.75	215.00
I2-0.8 IW/CPE ratio	27.31	75.66	218.58
I3-1.0 IW/CPE ratio	27.43	88.50	230.58
I4-1.2 IW/CPE ratio	28.92	92.25	244.50
SE (m) ±	0.69	1.73	4.23
CD at 5%	NS	6.00	14.64
B. Sub plot (Fertilizer levels)			
F1-120:60:30 (RDF) kg NPK ha-1	26.74	77.83	215.58
F2-RDF+Vermicompost 5tha-1	27.41	82.50	224.50
F3-180:90:60 kg NPK ha-1	27.88	83.25	234.41
F4-150:75:45 kg NPK ha-1	27.84	82.58	234.16
SE (m) ±	0.47	0.95	3.67
CD at 5%	NS	2.77	10.73
Interaction (AxB)			
SE (m) ±	0.94	1.90	7.35
CD at 5%	NS	NS	NS
General Mean	27.47	81.54	227.16

References

1. Bharati V, Nandan R, Pandey IB, Kumar V. Effect of irrigation levels on yield, water use efficiency and economics of winter maize (*Zea mays* L.) based intercropping systems. Indian Journal of Agronomy. 2007; 52(1):27-30.
2. Hani EA, Muna A, Hamad, Eltom EA. The effect of nitrogen and phosphorus fertilization on growth, yield and quality of forage maize (*Zea mays* L.). Journal of Agronomy. 2006; 5(3):515-518.
3. Jackson NL. In soil chemical analysis. Indian edition, Asia Publishing House, New Delhi, 1967.
4. Kumar A, Chhillar RK, Gautam RC. Nutrient requirement of winter maize (*Zea mays* L.) based intercropping system. Indian J Agric. Sci. 2006; 76:315-318.
5. Safdar Ali, Sahiba M, Malik A, Hassam F, Ansar M. Growth of rainfed fodder maize under different levels of nitrogen and phosphorus. Pakistan Journal of Agriculture Research. 2012; 25(3):196-205.
6. Shivakumar HK, Ramachandrappa BK, Nanjappa HV, Mudalagiriyappa. Effect of phenophase based irrigation

schedules on growth, yield and quality of baby corn. Agricultural Science. 2011; 2(3):267-272.

7. Singh AK, Singh GR, Dixit RS. Influence of plant population and moisture regimes on nutrient uptake and quality of winter maize (*Zea mays* L.). Indian Journal of Agronomy. 1997; 42(1):107-111