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Effect foliar application of animal urine and panchagavya on nitrate reductase activity and soluble protein content in shoot tip of deshi cotton

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ABSTRACT

Investigation carried out at Cotton Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola indicating that amongst all the treatments of different concentration of animal urine and *Panchagavya*, foliar application of cow urine 6% (T_7) followed *Panchagavya* 6% (T_9) recorded highest nitrate reductase activity and soluble protein content in shoot tip of cotton c.v. AKDH-5 (prereleased) at all the growth stages right from vegetative to boll formation stages. This information may be very useful because above treatments favourd in stimulating the better growth, increasing number of sympodial branches and ultimately for getting higher productivity to the cultivators.

Key words : Animal urine, Panchagavya, Auxin, NR activity, Soluble protein content.

INTRODUCTION

Deshi cotton varieties are grown in India in about 20% of the total area. The characteristic of these varieties are their strong resistance to diseases, insect pest, drought resistance and suitability for rain fed condition. Hence, any variety evolved from Asiatic cotton will be valuable contribution if it can combine yield and quality. These parameters are mainly controlled by physiology of plant. The physiology of cotton was not engaged enough attention of research workers in India. Thus this crop offers a good scope for investigation in the physiological aspects. The yield dependent on several physiological and metabolic process of the plant and process has some correlation with auxin, enzymes and protein content. Auxin is an internal factor for growth, plays significant role in growth stages. Enzymes in crop may act as a carrier for crop growth (Mansinghka, 2005).

Now a days cultivators have a trend to follow the organic farming. Therefore, while practicing the organic farming they use animal urine as a source of organic fertilizer. In such practices of using animal urine specially cow urine they observed good and satisfactory growth and development of the crop. This enhanced growth and development of the crop finally remained responsible for increasing the yield levels.

Nitrate reductase enzyme helps to convert unavailable nitrate in available nitrite form and again increasing protein content in shoot tip hence both are essential to enhance the over all growth and development of crop. The present study is to find out the effect of animal urine and Panchagavya on a activity of Nitrate reductase enzyme and soluble protein content in shoot tip of cotton cv. AKDH-5 (Prereleased).

MATERIALS AND METHODS

The experiment was carried out on the field of cotton research unit. Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *kharif* 2005-06, with AKDH-5 (prerelased) variety of deshi cotton. The experiment was laid out in Randomized Block Design with ten treatments

Table 1 : Concentration of IAA (ppm) in cow urine, buffalo urine and Panchagavya in Pure form and of different concentration

Sr. No.	Urine concentration	IAA concentration (ppm)
1.	Pure cow urine	237.8
2.	Cow urine 2 %	6.56
3.	Cow urine 4 %	11.78
4.	Cow urine 6 %	15.44
5.	Pure buffalo urine	173.7
6.	Buffalo urine 2 %	5.35
7.	Buffalo urine 4 %	8.75
8.	Buffalo urine 6 %	11.35
9.	Panchagavya	209.2
10.	Panchagavya urine 2 %	5.90
11.	Panchagavya urine 4 %	9.61
12.	Panchagavya urine 6 %	13.49

N.B.: Auxin content in animal urine was estimated in the laboratory of molecular biology department of Botany Dr. Panjabrao Deshmukh Krishi Vidhapeeth, Akola as per the procedure given by Krishnamoorthy (1993)

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replicated three times. The treatement details as follows : T_1 - Spray with 2 % Cow urine, T_2- Spray with 2 % Buffalo urine, T_3 - Spray with 2 % *Panchagavya*, T_4 - Spray with 4 % Cow urine, T_5 - Spray with 4 % Buffalo urine, T_6 - Spray with 4 % *Panchagavya*, T_7 - Spray with 6 % Cow urine, T_8 - Spray with 6 % Buffalo urine, T_9 - Spray with 6 % *Panchagavya*, T_{10} - Spray with water only *i.e.* conrol.

Preparation of different concentrations of urine solutions:

2%, 4% and 6% cow and buffalo urine solution was prepared by adding 20 ml, 40 ml and 60 ml urine, respectively in 1 liter of tap water for each concentration separately.

Preparation of panchagavya:

For preparation of Panchagavya 500gm. of cow dung was mixed in 100 ml of tap water mixed it well so that to form the slurry. The cotton cloth 30cm. ´ 30cm. in size was dipped in to slurry to absorb the dung slurry. The cotton cloth was squeezed in to the container and 50ml. slurry was collected. Later on rest of the constituents of Panchagavya were measured minutely with measuring cylinder as below.

– Cow urine 50 ml.
– Cow milk 50 ml.
– Cow curd 50 ml.
– Cow ghee 50 ml.

The above four constituents having quantity of 50ml each were collected in conical flask of 500ml. capacity. The mixture in the flask then thoroughly shaked and then already prepared 50ml. cow dung slurry was added in to the mixture. After adding the slurry, the mixture shaked well and this mixture of five constituents is collected as *Panchagavya* (Dayanand, 1952).

In this way, the Panchagavya mixture of five constituents, each of 50ml. quantity was prepared and its final volume was 250ml. Now this Panchagavya of 250ml. quantity was treated as stock solution, from this stock solution 20ml, 40ml and 60ml. Panchagavya was added separately in same quantity of tap water and final volume was made up to one liter, so as to prepare 2, 4 and 6 per cent *Panchagavya* solution, respectively.

Both the activity of NR enzyme and soluble protein content were estimated in shoot tip at vegetative stage, square formation stage, 50 per cent flowering stage, boll formation stage and boll bursting stage as per used procedure given.

Analysis of data is subjected to standard statistical method as per procedure given by Gomez and Gomez (1984)

RESULTS AND DISCUSSION

It is observed from Table 2 that NR activity continuously decreased from vegetative stage to boll formation stage in all the treatments.

At vegetative stage *i.e.* at 25 DAS NR activity in shoot tip was maximum in all the treatments ranging from 2562.3 mmol/g/h. to 2589.0 mmol/g/h. All the treatments (T_1 to T_{10}) exhibited non significant difference in respect of NR activity at this stage.

At square formation stage treatment T_7 recorded significantly highest NR activity (2360.3 µmol/g/h) amongst all the treatments followed by T_9 (2148.3 µmol/

Table 2: Effect of foliar application of animal urine on NR activity (« mole / g/h) in shoot tip at different growth stages of cotton CV. AKDH-5

Treatment	Vegetative stage i.e. 25 DAS	Square formation	50% flowering	Boll formation
T_1 – Cow urine 2%	2567.7	2023.3	1840.7	1735.0
T_2 – Buffalo urine 2%	2589.0	1715.0	1544.0	1448.3
T_3 - Panchagavya 2%	2567.3	1807.0	1616.7	1574.3
T_4 – Cow urine 4%	2568.3	2120.0	1832.7	1763.3
T_5 – Buffalo urine 4%	2568.3	1870.0	1664.0	1510.7
T_6 – Panchagavya 4%	2570.7	1985.0	1797.0	1608.0
T_7 – Cow urine 6%	2562.7	2360.3	2061.0	1862.7
T_8 – Buffalo urine 6%	2567.7	1926.0	1670.7	1547.7
T_9 – Panchagavya 6%	2568.0	2148.3	1859.0	1646.0
T_{10} – Control	2568.3	1687.7	1500.3	1412.7
'F' test	NS	Sig.	Sig.	Sig.
S.E. ±	2.3727	9.2296	14.6768	8.1286
C.D. (P=0.05)	-	25.9223	41.22	22.8302

Table 3: Effect of foliar application of animal urine on Soluble Protein NR activity (mg/g) in shoot tip at different growth stages of cotton cv. AKDH-5

Treatment	Square formation	50% flowering	Boll formation	Boll bursting
T_1 – Cow urine 2%	0.9191	0.9881	1.0171	1.0053
T_2 – Buffalo urine 2%	0.9003	0.9422	0.9883	0.9671
T_3 - Panchagavya 2%	0.9033	0.9663	0.9833	0.9851
T_4 – Cow urine 4%	0.9871	1.0422	1.0612	1.0322
T_5 – Buffalo urine 4%	0.9202	0.9822	1.0272	0.9933
T_6 – Panchagavya 4%	0.9353	0.9991	1.0222	1.0044
T_7 – Cow urine 6%	1.1144	1.1471	1.1783	1.1233
T_8 – Buffalo urine 6%	0.9883	1.0182	1.0681	1.0561
T_9 – Panchagavya 6%	1.0151	1.0353	1.0748	1.0622
T_{10} – Control	0.8821	0.9171	0.9222	0.9252
'F' test	Sig.	Sig.	Sig.	Sig.
S.E.±	0.0093	0.0092	0.0107	0.0041
C.D. (P=0.05)	0.028	0.026	0.0301	0.0115

g/h,) T_4 (2120.0 mmol/g/h), T_1 (2023.3 µmol/g/h), T_6 (1985.0 µmol/g/h), T_8 (1926.0 µmol/g/h), T_5 (1870.0 µmol/g/h), T_3 (1807.0 µmol/g/h). T_2 (1715.0 µmol/g/h) and T_{10} (1687.7 µmol/g/h). In general, more or less similar trend was followed at rest of the growth stages.

In case of soluble protein content (Table 3) showed that it was progressively increased from square formation stage to boll formation stage and similarly later on it decreased at boll bursting stage in all the treatments. Treatments T_7 (cow urine 6%) recorded significantly highest soluble protein in shoot tip (1.114 mg) followed by treatment T_9 (1.015 mg), T_8 (0.988 mg), T_4 (0.987 mg), T_6 (0.935 mg), T_5 (0.920 mg), T_1 (0.919 mg), T_3 (0.903 mg), T_2 (0.900 mg) and T_{10} (0.882 mg)at square formation. However, treatment T_1 and T_5 and treatment T_4 and T_8 remained at par. In general more or less similar trend was observed at 50 per cent flowering stage, boll formation stage and boll bursting stage also.

It is depicted from above results that the treatment T_7 (cow urine 6%) exhibited best nitrogen utilization amongst all the treatments at all growth stages. However treatment T_9 (*Panchagavya* 6%) also indicated better nitrogen utilization at all the growth stages. The nitrogen utilization in case of both the treatments as mentioned above was found superior because of its influence in increasing the nitrate reductase activity (mmoles of KNO_3 reduced/g/h.) and also both the treatments showed maximum content of soluble protein in shoot tip.

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