



RESEARCH ARTICLE

Influence of Farm Yard Manure, Farm Yard Manure + Urea, and Urea on Crop Yield in Prishnaparni (*Uraria picta* Desv. ex DC.)

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ABSTRACT

To evaluate the effect of farm yard manure (FYM) alone, FYM + urea, and urea alone on the growth and yield of *Uraria picta* Desv. ex DC. with two physicochemically different soils of Bundelkhand region, pot experiment was conducted during 2010 to 2011 and 2014 to 2015. FYM + urea applied in 50:50 ratio of nitrogen (N) gave best results as compared with the other treatments for crop yield in both the types of soils. Highest dry matter yield of 18.62 gm/pot was obtained during the year 2010 to 2011 and 24.33 gm/pot was obtained during the year 2014 to 2015 when FYM + urea was treated in black soil. The FYM alone and urea alone yielded dry matter of 16.03 gm/pot and 15.55 gm/pot respectively, during the year 2010 to 2011. Trends for the increase in dry matter yield were similar during both the years of study. In red soil also, dry matter yield was highest (10.23 gm/pot) during the year 2010 to 2011 and (14.33 gm/pot) 2014 to 2015 when FYM + urea was applied. The FYM + urea in 50:50 ratio is the best for the growth of *Uraria picta* Desv. ex DC.

Keywords: Crop yield, Dry matter, Farm yard manure + urea, Nitrogen, Soil, *Uraria picta* Desv. ex DC.

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INTRODUCTION

Uraria picta Desv. ex DC. is an important ayurvedic medicinal plant belonging to family Fabaceae. It is an erect woody herb, 2 to 3 feet height, and grows throughout India.¹ Whole plant, mainly roots are used in medicine. It is one of the ingredients of "Dashmool." Some of the well-known uses of the drugs are nervine tonic, carminative, diuretic, antipyretic, expectorant, and anti-inflammatory.

It has been identified as a promising plant which is in great demand and of high commercial value. The plant *Uraria picta* Desv. ex DC. is mostly collected from

wild sources to meet the requirement of pharmaceutical industries, and as such no effort has yet been made for its cultivation. *Uraria picta* Desv. ex DC. is one of the species identified for promoting cultivation in order to reduce pressure on their natural habitat and to meet the shortage against the demand of the industry. Therefore, efforts have been made in this study to evaluate the effect of farm yard manure (FYM) alone, FYM + urea, and urea alone with two physicochemically different soils on growth and yield of *Uraria picta* Desv. ex DC.

MATERIALS AND METHODS

Fresh mature seeds of *Uraria picta* Desv. ex DC. were collected from healthy plants grown in the garden of National Vrکشayurveda Research Institute, Jhansi, India. These seeds were sown at the depth of 0.5 cm in raised bed prepared with the red soil of garden in the month of May. Watering was done at an interval of 1 day. After 60 days, seedlings were uprooted carefully from raised beds and planted in pots filled with red and black soil in the "A" block of the Institute in the month of July. Urea was applied at 100 mg N/kg of soil, FYM was applied at 96.59 gm/pot, and FYM + urea were used in 50:50 ratio of nitrogen (N). Each pot (including control) was given 2.89 gm single super phosphate and 0.77 gm muriate of potash.

Following treatment combinations were used:

- Control (no N)
- Urea – N only
- FYM + urea (N used in 50:50 ratio from both the sources)
- FYM only (4 treatments × 2 types of soils × 3 replications = 24 pots)

Two physicochemically different soils were used for the experiment. Red soil showed alkaline reaction (pH = 8.24, electrical conductivity [EC] = 0.070 dsm⁻¹), low in organic carbon (0.34%), low in N (158.99 kg/ha), medium in phosphorous (P; 16.22 kg/ha), and medium in potassium (K; 80.75 kg/ha). Black soil was neutral in reaction (pH = 7.78, EC = 0.072 dsm⁻¹). Organic carbon was slightly higher (0.42%), high in N (188.47 kg/ha), low in P (10.99 kg/ha), and medium in K (80.32 kg/ha). Soil and plant N content analysis was done using standard

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Table 1: Effect of FYM, FYM + urea, and urea on the fresh matter yield and fresh root yield of *Uraria picta* Desv. ex DC. (2010–2011)

Treatments	Fresh matter yield (gm/pot)	Fresh root yield (gm/pot)
<i>Black soil</i>		
Control	43.66	9.66
FYM alone	50.66	13.33
FYM + urea	55.00	15.00
Urea alone	48.33	12.33
CD (p = 0.05)	NS	1.66
<i>Red soil</i>		
Control	13.00	1.00
FYM alone	14.66	1.33
FYM + urea	20.66	3.16
Urea alone	16.66	2.33
CD (p = 0.05)	3.85	NS

NS: Nonsignificant; CD: Critical difference

Table 2: Effect of FYM, FYM + urea, and urea on the fresh matter yield and fresh root yield of *Uraria picta* Desv. ex DC. (2014–2015)

Treatments	Fresh matter yield (gm/pot)	Fresh root yield (gm/pot)
<i>Black soil</i>		
Control	36.33	17.33
FYM alone	51.33	12.66
FYM + urea	68.00	17.00
Urea alone	43.33	9.33
CD (p = 0.05)	5.19	3.15
<i>Red soil</i>		
Control	16.66	1.33
FYM alone	23.33	7.00
FYM + urea	41.33	11.33
Urea alone	29.00	8.00
CD (p = 0.05)	7.55	1.54

CD: Critical difference

procedure² at Indian Grassland and Fodder Research Institute, Jhansi. Watering was done on alternate days. Pots were filled with 17 kg of soil. Each treatment was replicated thrice. Materials and methods remained the same in both the years of experimentation.

OBSERVATIONS

Fresh matter yield, root yield, dry matter yield, and N content in plant were determined.

RESULTS AND DISCUSSION

Fresh Matter Yield and Root Yield

In black soil, trends for the increase in fresh matter yield were slightly different from the plant heights, which were higher but not significant than the control during the year 2010 to 2011, whereas it was higher and significant during the year 2014 to 2015 (Tables 1 and 2).

It followed the below trend:

FYM + urea > FYM alone > urea alone > control.

For the increase in fresh matter yield and root yield, red soil followed the trend of plant height: FYM + urea > urea alone > FYM alone > control in both the years of study (Tables 1 and 2).

In black soil, highest (15.00 gm/pot) root yield was recorded with FYM + urea, followed by FYM alone (13.33 gm/pot) and urea alone (12.33 gm/pot), and in case of control, it was 9.66 gm/pot during the year 2010 to 2011. Similar trends were observed during the year 2014 to 2015.

In red soil, during the year 2010 to 2011, root yield was not significant, but it was higher than that for control. It was highest (3.16 gm/pot) with FYM + urea, followed by urea alone (2.33 gm/pot) and FYM alone (1.33 gm/pot) during the year 2010 to 2011. Trends for the increase in root yield were similar during both the years of the

Table 3: Effect of FYM, FYM + Urea, and urea on the dry matter yield, N content, and N uptake of *Uraria picta* Desv. ex DC. (2010–2011)

Treatments	Dry matter yield (gm/pot)	N content (%)	N uptake (mg/pot)
<i>Black soil</i>			
Control	12.03	1.43	172.42
FYM alone	16.03	1.35	214.78
FYM + urea	18.62	1.29	240.61
Urea alone	15.55	1.23	191.21
CD (p = 0.05)	2.93	NS	NS
<i>Red soil</i>			
Control	4.06	1.09	44.23
FYM alone	5.38	1.32	70.93
FYM + urea	10.23	1.20	122.39
Urea alone	7.66	0.98	76.59
CD (p = 0.05)	2.82	0.03	31.51

NS: Nonsignificant; CD: Critical difference

study in both types of soils (Tables 1 and 2), while it was significant during the year 2014 to 2015. Higher fresh matter yield and root yield among the treated soil might be due to higher N uptake (Table 3).

Dry Matter Yield, N Content, and N Uptake by the Crop

Dry matter yields were significantly higher in different treatments than in control in both the types of soils during both the years of the study (Tables 3 and 4). In a similar trend to that of fresh matter yield and root yield, highest dry matter yield (18.62 gm/pot) was influenced by FYM + urea, followed by FYM alone (16.03 gm/pot) and urea alone (15.55 gm/pot) during the year 2010 to 2011. Lowest (12.03 gm/pot) yield was reported in case of control (no N). In red soil also, the use of FYM + urea performed best (10.23 gm/pot), followed by urea alone (7.66 gm/pot) and FYM alone (5.38 gm/pot). Control recorded 4.06 gm/pot dry matter yield, which was lowest.

Table 4: Effect of FYM, FYM + urea, and urea on the dry matter yield of *Uraria picta* Desv. ex DC. (2014–2015)

Treatments	Dry matter yield (gm/pot)
<i>Black soil</i>	
Control	11.66
FYM alone	20.33
FYM + urea	24.33
Urea alone	15.33
CD (p = 0.05)	1.61
<i>Red soil</i>	
Control	6.00
FYM alone	8.00
FYM + urea	14.33
Urea alone	12.00
CD (p = 0.05)	3.45

CD: Critical difference

Trends for the increase in dry matter yield during the year 2014 to 2015 were similar to the trends obtained during the year 2010 to 2011 in both the types of soils (Tables 3 and 4). In a similar study, it has been reported that the use of the FYM has given higher yield of maize,³ rice,⁴ and garlic.⁵ N content and N uptake analyses were done for the year 2010 to 2011 crop only. Highest N content (1.35) in plant in black soil was reported with FYM, followed by FYM + urea (1.29%) and urea alone (1.23%). Highest N content (1.43%) was recorded with the control. Lower N content in treated plants could be due to dilution effect (Table 3).

In red soil, highest N content (1.32%) was reported with the FYM alone, followed by FYM + urea (1.20%) and urea alone (0.98%). Higher N content (1.09%) in the control could be due to lower yield (Table 3).

Though N uptake was higher among different treatments, it was not significant. It followed the trend for the dry matter yield in both types of soils. In black soil, FYM + urea recorded highest (240.61 mg/pot) N uptake, followed by FYM (214.78 mg/pot) and urea alone (191.21 mg/pot) (Table 3). In red soil also, FYM + urea recorded highest (122.39 mg/pot) N uptake, followed by urea alone (76.59 mg/pot) and FYM alone (70.93 mg/pot). Lowest N uptake (44.23 mg/pot) was recorded in

case of control (no N) (Table 3). In a similar study, higher N uptake by FYM + urea than urea alone in rice⁴ and wheat⁶ was observed.

CONCLUSION

Based on the observations made during the study, it is concluded that FYM + urea in 50:50 ratio of N is best for increasing the crop yield of *Uraria picta* Desv. ex DC. in both types of soils. Black soil responded better than the red soil. FYM alone and urea alone were almost on par with respect to crop yield. FYM alone, being an organic manure, was found to be better than urea alone with respect to pollution. The results obtained in these trials would be helpful to evolve agro technique of *Uraria picta* Desv. ex DC. cultivation.

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हिन्दी सारांश

फार्म यार्ड मन्योर, फार्म यार्ड मन्योर + यूरिया व केवल यूरिया का प्रश्नपर्णी (यूरेरिया पिक्टा डेस्व० एक्स डी० सी०) में उत्पादन पर प्रभाव

रूषा किरण

फार्म यार्ड मन्योर, फार्म यार्ड मन्योर + यूरिया (जिनमें नाइट्रोजन का आधा-आधा अनुपात रखा गया) व केवल यूरिया का प्रश्नपर्णी (यूरेरिया पिक्टा डेस्व० एक्स डी० सी०) में पौधों में वृद्धि व उत्पादन पर होने वाले परिणामों का अध्ययन किया गया। तीनों प्रकार के ट्रीटमेंट में दोनों काली व लाल मृदा में फार्म यार्ड मन्योर + यूरिया से बेहतर परिणाम प्राप्त हुए। जबकि केवल फार्म यार्ड मन्योर व केवल यूरिया के उपयोग से लगभग एक समान परिणाम प्राप्त किए गए जो की कंट्रोल (बिना नाइट्रोजन के) से बेहतर थे। विभिन्न मृदा नमूनों में काली मृदा एवं फार्म यार्ड मन्योर + यूरिया (50% नाइट्रोजन फार्म यार्ड मन्योर से + 50% नाइट्रोजन यूरिया से) पौधों की वृद्धि के लिए उपयुक्त सिद्ध हुआ।

