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## Effect of cow urine foliar spray on yield and economics of Byadgi chilli (*Capsicum annuum* L.) in a Vertisol

**Shaziya KL and Bidari BI**DOI: <https://doi.org/10.22271/chemi.2020.v8.i3am.9624>**Abstract**

A field experiment was conducted during *kharif* 2018 in the farmer's field at Agadi village (Tq: Hubballi) in Dharwad district to investigate the "Effect of cow urine foliar spray on yield and economics of Byadgi chilli (*Capsicum annuum* L.) In a Vertisol". Experiment consisted of 12 treatments with three replications. Results revealed that, two foliar applications of 15 per cent cow urine one each at 60 and 90 DAT recorded highest fruit yield (14.07 q ha<sup>-1</sup>) which was on par with two foliar applications at ten per cent (13.06 q ha<sup>-1</sup>). Cost of cultivation was maximum (Rs. 44,725 ha<sup>-1</sup>) for the treatments that received 5, 10 and 15 per cent cow urine at 60 + 90 DAT respectively, closely followed by treatment which received 50 ppm NAA spray at 60 DAT (Rs. 44,570). Treatment that received 15% cow urine spray at 60 DAT + 90 DAT recorded highest B:C ratio of 3.46.

**Keywords:** Cow urine, fruit yield, gross income, net income, B:C ratio**Introduction**

Byadgi Chilli is a long duration (180 to 210 days) and indeterminate crop requires timely manuring particularly at grand growth (60-75 DAT) and fruit development (90-105 DAT) stages. Chilli plants should have adequate supply of nitrogen during fruit development to enhance its yield. But, the conventional nitrogen fertilizers applied to soil as basal dose during transplanting and top dressed after 45 DAT are subjected to leaching, volatilization and run off losses. Hence, foliar application of nitrogen through cow urine in addition to top dressing of urea is very essential. On an average about 13.0 litres of urine will be excreted by a cow in a day. This urine gets lost due to percolation, evaporation and runoff in cattle shed particularly during rainy season, the volume of urine excreted by cow will be more. Hence urine excreted by farm animals can be used as source of nutrients for foliar spray after proper dilution with water. Analysis of cow urine revealed that, it is neutral in reaction (pH 7.10) and soluble salt content is 6.55 dS/ m. It contains 0.31 per cent N, 20 mg L<sup>-1</sup> P, 0.93 per cent K, 72 mg L<sup>-1</sup> of Ca + Mg. Thamhane *et al.* (1965) [5] reported that, cow urine contains 1 per cent N, 1.9 per cent K<sub>2</sub>O and traces of P<sub>2</sub>O<sub>5</sub> which can be used as source of liquid fertilizer. Besides it contains oxalic acid, hippuric acid, creatinine, urea, enzymes, steroids, propylene oxide, ethylene oxide, glycosides, glucose, citric acid, alkaloids, acetate, endosonine, carbolic acid and growth promoting substances (Agrawal, 2002) [1]. Foliar spray of cow urine at flowering and fruit development stages may significantly enhance fruit yield. Very little information is available about the foliar spray of cow urine as a source of nutrients in influencing the yield. Hence the present study is planned.

**Material and methods**

A field experiment was conducted during *kharif* 2018 in the farmer's field (Survey No. 88) at Agadi village (Tq., Hubballi) in Dharwad district. The soil of the experimental site is *Typic Chromustert*.

Soil of the experimental site is clay in texture, neutral in pH (7.40), normal in soluble salts (0.26 dS/m), medium in organic carbon (6.90 g kg<sup>-1</sup>), low in avail. nitrogen (188.65 kg ha<sup>-1</sup>) and phosphorus (19.85 kg ha<sup>-1</sup>), medium in potassium (290.50 kg ha<sup>-1</sup>) and high in avail.

sulphur (22.00 kg ha<sup>-1</sup>). Cow urine was collected from a selected animal and analysed for its nutrient content and reaction (pH) and TSS content. The concentration of diluted cow urine solution fixed for foliar spray is based on TSS content of solution as indicated by EC values. It was observed that, 4, 6, 8, 10, 12, 14, 15 and 20 per cent solutions of cow urine after dissolving in bore well water recorded TSS contents of 0.84, 0.95, 1.06, 1.14, 1.27, 1.46, 1.56 and 2.43 dS m<sup>-1</sup> respectively. Based on the critical limit of total salt content in spray solution as given by CSSRI, Karnal as 2 dS m<sup>-1</sup>, fifteen per cent solution of cow urine was taken as upper limit. Based on the peak requirement of nutrients to chilli crop, time and frequency of foliar sprays were fixed as 60 and 90 days after transplanting (DAT). The treatments details are furnished in Table 1. All the treatments received uniform dose of recommended fertilizers (100:50:50 N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O Kg ha<sup>-1</sup>) along with FYM of 25 tonnes ha<sup>-1</sup>. 45 days old chilli seedlings were transplanted at 75 cm X 75 cm spacing on 29/ 07/ 2018. Completely matured red fruits were harvested in two stages, first on 10/ 01/ 2019 and second on 30/ 01/ 2019. These red fruits were sundried and yield was recorded by pooling the fruits of two pickings and expressed in quintals per hectare.

**Table 1:** Treatment details

T <sub>1</sub>	Control (Water spray at 60 & 90 DAT)
T <sub>2</sub>	5% cow urine spray at 60 DAT
T <sub>3</sub>	10% cow urine spray at 60 DAT
T <sub>4</sub>	15% cow urine spray at 60 DAT
T <sub>5</sub>	5% cow urine spray at 90 DAT
T <sub>6</sub>	10% cow urine spray at 90 DAT
T <sub>7</sub>	15% cow urine spray at 90 DAT
T <sub>8</sub>	5% cow urine spray at 60 & 90 DAT
T <sub>9</sub>	10% cow urine spray at 60 & 90 DAT
T <sub>10</sub>	15% cow urine spray at 60 & 90 DAT
T <sub>11</sub>	1% urea spray at 60 DAT
T <sub>12</sub>	50 ppm NAA spray at 60 DAT

Note: RPP (Recommended Package of Practices) for chilli is 100:50:50 N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O Kg ha<sup>-1</sup> + FYM 25 tonnes ha<sup>-1</sup> is common for all the treatments.

### Yield parameters

#### Number of fruits per plant per picking

Number of red matured fruits per plant was counted from five randomly selected plants in the net plot area at each picking stage and average was worked out. There were totally two pickings.

#### Dry weight of 100 chilli fruits

Red ripe fruits harvested from the net plot area were sundried for 15 days till they become brittle. Fruits from all the three

pickings were pooled to get composite sample. One hundred fruits were randomly selected from each treatment and their weight was recorded.

#### Dry chilli yield per hectare

Based on the net plot yields, yield per hectare was calculated and expressed in quintals.

#### Economic analysis

Based on the prevailing price of inputs used and produce obtained during the year (2018-19), the net per profit hectare and benefit cost ratio were worked out by using the following formula

Net income per hectare (Rs.) = Gross income per hectare (Rs.) - Cost of cultivation per ha (Rs.)

$$\text{Benefit: Cost} = \frac{\text{Gross income ha}^{-1} \text{ (Rs.)}}{\text{Cost of cultivation ha}^{-1} \text{ (Rs.)}}$$

### Results and discussion

#### Fruit yield

Foliar application of 15% cow urine at 60 and 90 DAT (T<sub>10</sub>) recorded highest fruit yield (14.07 q ha<sup>-1</sup>) closely followed by treatment (T<sub>9</sub>) that received 10% cow urine spray at 60 and 90 DAT (13.06 q ha<sup>-1</sup>) and treatment (T<sub>4</sub>) that received 15% cow urine spray at 60 DAT (11.66 q ha<sup>-1</sup>) (Table 2). The growth hormones present in cow urine stimulated the meristematic tissue in chilli plants which lead to more flower buds and flowering. This might have formed more number of fruits in plants. Similar results on increased fruit yield were reported by Batra *et al.* (2006) [2] and Chaurasia *et al.* (2005) [3] in brinjal and tomato crops respectively. It was noticed that, treatments (T<sub>4</sub>, T<sub>7</sub> and T<sub>10</sub>) that received 15 per cent foliar spray recorded numerically higher fruit yield than treatments that received five (T<sub>2</sub>, T<sub>5</sub> and T<sub>8</sub>) and ten (T<sub>3</sub>, T<sub>6</sub> and T<sub>9</sub>) per cent foliar spray. This was due to increased absorption of nitrogen by chilli leaves leading to increased chlorophyll content and photosynthesis. Further the photosynthates were translocated to developing fruits facilitated by the presence of potassium (Prabhavathi *et al.*, 2009) [4]. Control (T<sub>1</sub>) that received water spray recorded lowest fruit yield (9.68 q ha<sup>-1</sup>) which was on par with treatment T<sub>12</sub> that received 50 ppm NAA foliar spray at 60<sup>th</sup> DAT (9.90 q ha<sup>-1</sup>) as well as treatment (T<sub>11</sub>) that received urea spray (10.30 q ha<sup>-1</sup>). This was because of non-availability of N, P and K during flowering and fruit development stages in adequate amount otherwise supplied through urine spray. This has resulted in lower yield attributes.

**Table 2:** Effect of foliar spray of cow urine on yield parameters and dry fruit yield of chilli (Cv. Dyavnur)

Treatments	No. of fruits/plant/ picking	100 fruit weight (g)	Fruit yield (q ha <sup>-1</sup> )
T <sub>1</sub> - Control (Water spray at 60 & 90 DAT)	16.85	148.80	9.68
T <sub>2</sub> - 5% cow urine spray at 60 DAT	17.50	151.97	10.01
T <sub>3</sub> - 10% cow urine spray at 60 DAT	18.82	154.27	10.55
T <sub>4</sub> - 15% cow urine spray at 60 DAT	21.95	163.10	11.66
T <sub>5</sub> - 5% cow urine spray at 90 DAT	19.20	155.17	10.80
T <sub>6</sub> - 10% cow urine spray at 90 DAT	20.75	161.70	11.30
T <sub>7</sub> - 15% cow urine spray at 90 DAT	21.15	163.17	11.65
T <sub>8</sub> - 5% cow urine spray at 60 & 90 DAT	20.30	160.53	11.25
T <sub>9</sub> - 10% cow urine spray at 60 & 90 DAT	23.13	167.67	13.06
T <sub>10</sub> - 15% cow urine spray at 60 & 90 DAT	25.78	168.73	14.07
T <sub>11</sub> - 1% urea spray at 60 DAT	15.85	151.80	10.30
T <sub>12</sub> - 50 ppm NAA spray at 60 DAT	14.78	148.5	9.90
S.Em. ±	1.27	5.45	0.74

C.D. (0.05)	3.72	16.56	2.17
C.V. (%)	11.15	10.52	11.44

DAT - Days after transplanting

RDF - 100:50:50 N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O kg ha<sup>-1</sup> respectively + FYM (25 t ha<sup>-1</sup>) is common for all the treatments

### Economic analysis

Ultimately, the acceptance of any generated technology is based on the costs involved in cultivation and net returns from it. The current inquiry showed maximum cultivation costs (Rs. 44,725 ha<sup>-1</sup>) for T<sub>8</sub>, T<sub>9</sub> & T<sub>10</sub> treatments receiving 5, 10 and 15 per cent cow urine at 60 + 90 DAT, respectively. Minimum cultivation costs (Rs. 44,170) were reported in T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> treatments (Table 3).

Treatment (T<sub>10</sub>) that received 15% cow urine spray at 60 DAT + 90 DAT had the highest gross income (Rs. 1,54,770) and net income (Rs. 1,10,045) with highest B: C ratio of 3.46. The lowest gross income (Rs. 87,120) and net income (Rs. 42,950) were achieved in control (T<sub>1</sub>) along with lowest B: C ratio of 1.97. All treatments that received cow urine foliar spray recorded higher B:C ratio than control. This was due to higher fruit yield in cow urine spray treatments than control which received water spray.

**Table 3:** Effect of cow urine foliar spray on economics of chilli

Treatments	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)	B:C ratio
T <sub>1</sub> - Control (Water spray at 60 & 90 DAT)	44,170	87,120	42,950	1.97
T <sub>2</sub> - 5% cow urine spray at 60 DAT	44,170	90,090	45,920	2.03
T <sub>3</sub> - 10% cow urine spray at 60 DAT	44,170	1,00,225	56,055	2.27
T <sub>4</sub> - 15% cow urine spray at 60 DAT	44,170	1,16,600	72,430	2.63
T <sub>5</sub> - 5% cow urine spray at 90 DAT	44,355	1,08,000	63,645	2.43
T <sub>6</sub> - 10% cow urine spray at 90 DAT	44,355	1,13,000	68,645	2.55
T <sub>7</sub> - 15% cow urine spray at 90 DAT	44,355	1,16,500	72,145	2.62
T <sub>8</sub> - 5% cow urine spray at 60 & 90 DAT	44,725	1,12,500	67,775	2.51
T <sub>9</sub> - 10% cow urine spray at 60 & 90 DAT	44,725	1,43,660	98,935	3.21
T <sub>10</sub> - 15% cow urine spray at 60 & 90 DAT	44,725	1,54,770	1,10,045	3.46
T <sub>11</sub> - 1% urea spray at 60 DAT	44,240	92,700	48,460	2.09
T <sub>12</sub> - 50 ppm NAA spray at 60 DAT	44,570	99,000	54,430	2.22

### Conclusion

Two foliar applications of 15 per cent cow urine one each at 60 and 90 DAT recorded highest fruit yield (14.07 q ha<sup>-1</sup>) closely followed by two foliar sprays at ten per cent (13.06 q ha<sup>-1</sup>), further followed by one spray of cow urine at 15 per cent on 60 DAT (11.66 q ha<sup>-1</sup>).

Foliar spray of 15 per cent cow urine at 60 and 90 DAT has recorded highest B:C ratio (3.46) followed by 10 per cent cow urine spray (3.21). Lowest B:C ratio (1.97) was recorded in control.

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