

Effect of Time of Sowing, Spacing and Seed Rate on Seed Yield and Quality of Fodder Cowpea [*Vigna unguiculata* (L.) Walp]

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Cowpea is an important fodder legume grown during *kharif* season. It is mainly grown for fodder either pure or in mixture with graminaceous fodders like maize, sorghum and teosinte so as to enrich the nutritive value due to its higher protein content. Besides, it also improves the fertility of the soil that may reduce the nitrogen requirement of the companion or succeeding crop in rotation. Seed is the most important component in fodder crop production programme. Since most of the fodder crops are harvested for green fodder before flowering stage or before seed maturity, the provision of seed every time in forage production programmes becomes a difficult practice. There is also lack of information on seed production of fodder cowpea. Keeping this background in view, the present investigation was carried out to determine the optimum time of sowing, spacing and seed rate for higher seed production and quality of fodder cowpea seeds.

The study was undertaken during *kharif* 2005 on deep black clay soils of Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, Karnataka under rainfed conditions. The soil was having medium (305 kg ha⁻¹) available nitrogen, available phosphorus (23.87 kg ha⁻¹) and available potassium (210.45 kg ha⁻¹). Eighteen treatment combinations consisting of three time of sowing (June II, July I and July II fortnight), two row spacings (30

and 45 cm) and three seed rates (20, 25 and 30 kg ha⁻¹) were tested in split-split plot design with three replications. The entire quantity of recommended dose of fertilizers i.e., 25:50:50 kg NPK ha⁻¹ was applied as a basal dose. All cultural practices were followed as per the recommendations. The observations on yield parameters viz., number of pods plant⁻¹, number of seeds pod⁻¹, 1000 seed weight, seed yield plant⁻¹ and seed yield ha⁻¹ and the seed quality parameters viz., germination, field emergence, root length, shoot length, total seedling length and seedling vigour index were recorded. The germination percentage was tested according to ISTA rules [1] and seedling vigour was determined by using the formula given by Abdul-Baki and Anderson [2].

Sowing in June II fortnight produced significantly higher seed yield (925 kg ha⁻¹) compared to July I fortnight (675 kg ha⁻¹) and July II fortnight sowing (579 kg ha⁻¹). However, July I fortnight was significant over July II fortnight (Table 1). June II fortnight sowing produced 27 and 43 per cent higher seed yield compared to July I fortnight and July II fortnight, respectively. The higher seed yield in June II fortnight was mainly due to higher performance of all the yield components. These results are in conformity with Yadav [3] and Ravinder and Singh [4]. The significant increase in seed yield in June II fortnight sowing can be attributed to

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the increased performance of all the yield parameters (Table 1) viz., number of pods (11.9 plant^{-1}), number of seeds (11.9 pod^{-1}), 1000 seed weight (101.9 g) and seed yield ($14.40 \text{ g plant}^{-1}$). These results are in agreement with the earlier findings [3, 4]. The significantly less yield in July II fortnight was due to significantly lower performance of all the yield parameters.

The seed quality parameters were not influenced significantly due to time of sowing (Table 2). However, June II fortnight sowing recorded highest germination (89.9 %), field emergence (85.4 %) total seedling length (36.2 cm) and seedling vigour index (3266.3) compared to July I fortnight and July II fortnight sowing. The present results also confirmed the earlier findings of Hari and Gill [5] and Sharma [6].

The closer row spacing of 30 cm produced significantly higher seed yield (743 kg ha^{-1}), which was 10 per cent higher, compared to wider row spacing of 45 cm. This was mainly due to higher performance of all the yield components in closer (30 cm) row spacing. These results are in agreement with earlier findings [3, 7].

Seed quality parameters were not influenced significantly by row spacing. However, the wider row spacing of 45 cm recorded higher germination (88.9%) over 30 cm. Similar results were reported by Prakash [8] in French bean.

The effect of seed rate on seed yield and seed quality was found non significant. Irrespective of seed rate, early sowing (June II fortnight), closer row spacing (30 cm) were found better for higher seed yield of fodder cowpea.

Table 1. Seed yield and yield components of fodder cowpea as influenced by time of sowing, spacing and seed rate

| Treatments | No. of pods plant^{-1} | No. of seeds plant^{-1} | 1000-seed weight (g) | Seed yield $\text{plant}^{-1}(\text{g})$ | Seed yield (kg ha^{-1}) |
|------------------------|------------------------------------|-------------------------------------|-------------------------|---|---------------------------------------|
| Time of sowing | | | | | |
| June II fortnight | 11.9 | 11.9 | 101.9 | 14.40 | 925 |
| July I fortnight | 9.2 | 10.2 | 98.8 | 8.51 | 675 |
| July II fortnight | 7.6 | 10.1 | 98.4 | 6.12 | 519 |
| S.Em \pm | 0.24 | 0.34 | 0.36 0.40 | 18.56 | |
| CD (P=0.05) | 0.96 | 1.34 | 1.4 | 1.59 | 72.89 |
| Row spacing | | | | | |
| 30cm | 9.9 | 10.7 | 99.9 | 10.14 | 743 |
| 45 cm | 9.2 | 10.7 | 99.6 | 9.24 | 670 |
| S.Em \pm CD | 0.20 | 0.13 | 0.35 | 0.17 | 18.93 |
| (P=0.05) | 0.70 | NS | NS | 0.61 | 65.52 |
| Seed rate | | | | | |
| 20 kg ha^{-1} | 9.5 | 10.8 | 99.4 | 10.08 | 673 |
| 25 kg ha^{-1} | 9.5 | 10.5 | 99.6 | 9.33 | 741 |
| 30 kg ha^{-1} | 9.7 | 10.9 | 100.1 | 9.62 | 706 |
| S.Em \pm CD | 0.26 | 0.30 | 0.36 | 0.37 | 28.19 |
| (P=0.05) | NS | NS | NS | NS | NS |

NS: Non significant; Interaction effects were non significant

Table 2. Seed quality parameters of fodder cowpea as influenced by time of sowing, spacing and seed rate

| Treatments | Germination (%) | Field emergence (%) | Root length (cm) | Shoot length (cm) | Total Seedling (cm) | Seedling vigour index |
|------------------------|-----------------|---------------------|------------------|-------------------|---------------------|-----------------------|
| Time of sowing | | | | | | |
| June II fortnight | 71.84(89.9) | 67.76 (85.4) | 16.7 | 19.4 | 36.2 | 3266.3 |
| JuJy I fortnight | 70.74 (89.0) | 67.42 (85.0) | 16.1 | 19.1 | 35.3 | 3147.4 |
| JuJy II fortnight | 70.30 (88.5) | 67.08 (84.5) | 15.5 | 18.8 | 34.3 | 3045.6 |
| S.Em± CD | 0.48 | 1.07 | 0.33 | 0.21 | 0.45 | 53.60 |
| (P=0.05) | NS | NS | NS | NS | NS | NS |
| Row spacing | | | | | | |
| 30cm | 71.26(28.4) | 67.45 (85.0) | 16.1 | 19.5 | 35.6 | 3194.7 |
| 45cm | 70.66 (88.9) | 67.39 (84.9) | 16.1 | 18.8 | 34.9 | 3111.5 |
| S.Em± | 0.29 | 0.62 | 0.09 | 0.22 | 0.24 | 29.39 |
| CD (P=0.05) | NS | NS | NS | NS | NS | NS |
| Seed rate | | | | | | |
| 20 kg ha ⁻¹ | 70.97 (89.2) | 67.50(85.1) | 16.4 | 19.2 | 35.7 | 3187.1 |
| 25 kg ha ⁻¹ | 71.01 (89.1) | 67.29 (84.8) | 15.8 | 18.9 | 34.7 | 3105.9 |
| 30 kg ha ⁻¹ | 70.89(89.1) | 67.47 (84.9) | 16.1 | 19.3 | 35.4 | 3166.3 |
| S.Em± CD | 0.45 | 0.87 | 0.28 | 0.40 | 0.58 | 55.04 |
| (P=0.05) | NS | NS | NS | NS | NS | NS |

NS — Non-significant; Figures in the parentheses are original values; Interaction effects were non-significant.

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