

## CO(CP) 7 : A new high yielding mutant variety of cowpea

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**Abstract:** The cowpea culture COCP 702, a 20 kR gamma ray mutant derivative of CO 4 tested in station and district trials and as Co Vu 702 in the All India Coordinated trials of Arid legumes was released as a new cowpea variety CO(CP) 7 for general cultivation in Tamil Nadu. The culture COCP 702 recorded an average yield of 900 kg/ha registering 18.9, 19.3 and 14.3 per cent increased yield over CO 6, P 152 (C 152) and Vamban 1 varieties respectively, when it was tested in 144 trials including 104 trials under farmers holdings (ART). It is suitable for cultivation in all the three seasons, where cowpea is grown in Tamil Nadu and it matures in 65-70 days. The resistance levels of this culture against major pests and diseases are on par with CO 6. The grain colour, appearance, flavour, texture and taste of COCP 702 is more preferred by the consumers compared to CO 6.

**Key words :** CO(CP) 7, Cowpea, Mutant, Gamma ray, New variety.

### Introduction

Cowpea (*Vigna unguiculata* (L.) Walp), a versatile and an important food legume is cultivated mostly in Africa, Asia and the Mediterranean. Being a drought tolerant crop with better growth in warm climates, cowpea is the most popular crop in the semiarid regions of the tropics, where other food legumes do not perform as well. In Tamil Nadu, the area of cowpea, which is grouped under other pulses is estimated to be around 1 lakh hectares (Anon, 2001). The most popularly cultivated variety

CO 6 gives an average yield of 671 kg ha<sup>-1</sup>. Hence, an attempt was made to develop high yielding cowpea variety suitable for Tamil Nadu conditions.

### Materials and Methods

Seeds of CO 4 and CO 6 cowpea varieties were treated with gamma rays at 20 kR, 40 kR, 60 kR, 80 kR and 100 kR and evaluated from M<sub>1</sub> - M<sub>6</sub> generations. The best performing genotype selected for grain yield at M<sub>6</sub> generation was named as CoVu 702. The culture CoVu

Table 1. Overall mean performance of COCP 702

| Sl. no. | Type of trial                                 | No. of trials | Mean grain yield kg ha <sup>-1</sup> |       |       |       | % yield increase of COCP 702 over |       |       |
|---------|---|---------------|--------------------------------------|-------|-------|-------|-----------------------------------|-------|-------|
|         |   |               | COCP 702                             | CO 6  | P 152 | VBN 1 | CO 6                              | P 152 | VBN 1 |
| 1.      | Station trial (1997-98 and 1998-99)           | 6             | 1112.3                               | 840.5 | -     | -     | 32.2                              | -     | -     |
| 2.      | Multilocation trial (1999-2000 and 2000-2001) | 34            | 1001.0                               | 767.0 | -     | -     | 30.5                              | -     | -     |
| 3.      | Adaptive Research trial (2000-2001)           | 104           | 855.0                                | 749.0 | 754.0 | 787.0 | 14.2                              | 13.4  | 8.6   |
|         | Mean  | 144           | 900.2                                | 757.1 | 754.0 | 787.0 | 18.9                              | 19.3  | 14.3  |

Table 2. Overall seasonwise performance of COCP 702 cowpea

| Particular           | Grain yield kg ha <sup>-1</sup> during |      |       |       |          |      |       |       |          |      |       |       |
|----------------------|--|------|-------|-------|----------|------|-------|-------|----------|------|-------|-------|
|                      | Kharif                                 |      |       |       | Rabi     |      |       |       | Summer   |      |       |       |
|                      | COCP 702                               | CO 6 | P 152 | VBN 1 | COCP 702 | CO 6 | P 152 | VBN 1 | COCP 702 | CO 6 | P 152 | VBN 1 |
| Multilocation trials | 1106                                   | 806  | -     | -     | 994      | 793  | -     | -     | 1237     | 922  | -     | -     |
| MLT                  | 730                                    | 608  | -     | -     | 1154     | 855  | -     | -     | 1119     | 839  | -     | -     |
| ART                  | 799                                    | 693  | 760   | 762   | 909      | 783  | 788   | 785   | 857      | 772  | 714   | 815   |
| Mean                 | 878                                    | 702  | 760   | 762   | 1019     | 810  | 788   | 785   | 1071     | 844  | 714   | 815   |
| Per cent over CO 6   | 25.0                                   | -    | -     | -     | 25.8     | -    | -     | -     | 26.8     | -    | -     | -     |
| Per cent over P 152  | 15.5                                   | -    | -     | -     | 29.3     | -    | -     | -     | 50.0     | -    | -     | -     |
| Per cent over VBN 1  | 15.2                                   | -    | -     | -     | 29.8     | -    | -     | -     | 31.4     | -    | -     | -     |

Table 3. Performance of COCP 702 (CoVu 702) cowpea in All India Coordinated trials of Kharif 2000

| No. | Location   | Duration (days) |       |       | Grain yield kg ha <sup>-1</sup> |        |        |
|-----|------------|-----------------|-------|-------|---------------------------------|--------|--------|
|     |            | CoVu 702        | V 585 | V 240 | CoVu 702                        | V 585  | V 240  |
| 1.  | Jodhpur    | 56              | 66    | 62    | 857.0                           | 448.0  | 627.0  |
| 2.  | Durgapura  | 62              | 74    | 73    | 708.3                           | 152.8  | 361.1  |
| 3.  | Fatehpur   | 71              | 86    | 84    | 356.0                           | 135.0  | 271.0  |
| 4.  | Hisar      | 63              | 70    | 75    | 1099.0                          | 798.0  | 880.0  |
| 5.  | SK Nagar   | 64              | 74    | 71    | 694.0                           | 220.0  | 267.0  |
| 6.  | Vamban     | 75              | 70    | 77    | 580.0                           | 322.0  | 169.0  |
| 7.  | Coimbatore | 83              | 82    | 84    | 954.0                           | 868.0  | 825.0  |
| 8.  | Bangalore  | 82              | 81    | 78    | 1149.0                          | 1385.0 | 2070.0 |
| 9.  | Udaipur    | 61              | 68    | 67    | 795.0                           | 919.3  | 878.8  |
| 10. | Srinagar   | 99              | 101   | 103   | 868.0                           | 708.0  | 715.0  |
| 11. | New Delhi  | -               | -     | -     | 1304.0                          | 851.0  | 1193.0 |
|     | Mean       | 72              | 77    | 77    | 866.1                           | 658.7  | 798.9  |

Source : Annual Report of All India Co-ordinated Research Project on Arid Legumes, 2000-2001

Table 4. Reaction to major pests and diseases at Coimbatore

| S.No. | Genotype | Pod borer %  |            | Incidence of CYMV % | Incidence of <i>Cercospora</i> leaf spot |
|-------|----------|--------------|------------|---------------------|--|
|       |          | Kharif '2000 | Rabi '2000 | Kharif '2000        | Rabi '2000                               |
| 1.    | COCP 702 | 19.1         | 10.0       | 0.0                 | 3.4                                      |
| 2.    | CO 6     | 14.2         | 15.0       | 0.0                 | 2.8                                      |

702 was evaluated in Coimbatore station trial during 1997-1998 and 1998-1999 and in multilocation trial during 1999-2000 and 2000-2001. The culture CoVu 702 was renamed as

COCP 702 and was tested in farmers holdings under ART in different districts of Tamil Nadu during 2000-2001. The culture was tested in the All India Coordinated trials of cowpea under

the All India Coordinated Research Project on Arid Legumes as CoVu 702 in eleven states of India during Kharif 2000.

### Results and Discussion

The consolidated overall performance of COCP 702 in different yield trials viz., station trials, multilocation trials and adaptive research trials over three seasons is presented in Table 1 and the performance in each session is given in Table 2.

In station trials, COCP 702 has given an average grain yield of 1112.3 kg/ha, which was 32.3% higher than COCP 702. In MLT, the yield increase recorded by COCP 702 over CO 6 was 30.5 per cent. It has registered an average yield of 855 kg/ha under ART conducted in 104 farmers holdings. It was 14.2% higher than the variety CO 6. Considering all the trials together (144 trials), it has recorded an average grain yield of 900.2 kg/ha, which was 18.9% higher than CO 6. Regarding the seasonwise performance of this culture, it has

surpassed the variety CO 6 uniformly in grain yield in all the three seasons (Table 2).

The culture COCP 702 tested as CoVu 702 in the All India Coordinated Trials during Kharif 2000, stood first in average grain yield of eleven locations of India, the average yield being 866 kg/ha (Anon, 2000). The yield increase of this culture over national checks, V 58 and V 240 is 31.4% and 8.4%, respectively (Table 3).

Regarding the reaction of this culture to pod borer, it was on par with CO 6 (Table 4). When it was tested at Coimbatore for major diseases viz., cowpea yellow mosaic virus and Cercospora leaf spot, the reaction was more or less similar to that of CO 6 (Table 4).

The grain quality characters of cowpea COCP 702 and CO 6 were evaluated in detail (Table 5). Regarding protein content, COCP 702 had a higher protein content (23.5%) than that of CO 6 (21.9%). The length, breadth

Table 5. Qualitative test of cowpea culture COCP 702

| Particulars   | COCP 702 | CO 6  |
|---|----------|-------|
| <i>A. Protein content</i>                             |          |       |
| Protein content                                       | 23.5     | 21.9  |
| <i>B. Physical characteristics</i>                    |          |       |
| Length (cm)   | 0.60     | 0.63  |
| Breadth (cm)  | 0.56     | 0.53  |
| Width (mm)  | 3.0      | 5.0   |
| 1000 grains weight (g)                                | 137.5    | 139.1 |
| <i>C. Cooking Characteristics (Grain taken - 10g)</i> |          |       |
| Cooked weight (g)                                     | 21.1     | 23.00 |
| Cooked volume (ml)                                    | 25.0     | 27.00 |
| Actual time taken for cooking (min)                   | 55       | 62    |
| Water absorption (ml)                                 | 77       | 83    |
| Leaching loss °Bx                                     | 2        | 3     |
| <i>D. Organoleptic evaluation (Scores out of 4.0)</i> |          |       |
| Colour and appearance                                 | 3.60     | 3.80  |
| Flavour   | 3.60     | 3.88  |
| Texture   | 3.80     | 3.80  |
| Taste   | 3.68     | 3.96  |
| Overall acceptability                                 | 3.68     | 3.88  |

Table 6. Description of cowpea COCP 702

|                                |   |   |
|--------------------------------|---|---|
| Plant height (cm)              | : | 40-55 cm  |
| Growth habit                   | : | Erect   |
| Leaves                         | : | Ovate, trifoliate, entire, green and glabrous   |
| Petiole colour                 | : | Green   |
| Stem colour                    | : | Green with purple ring at fruiting nodes  |
| Branches                       | : | 5-8   |
| Inflorescence                  | : |   |
| i. Flower colour               | : | Papilionaceous corolla-<br>Standard Petal dorsal - yellow<br>ventral - violet<br>Wing and keel petal - violet |
| ii. Calyx                      | : | Light green   |
| iii. Raceme position           | : | Mostly above canopy   |
| iv. Pod attachment to peduncle | : | Sub-erect   |
| v. Immature pod colour         | : | Green   |
| vi. Mature pod colour          | : | Straw colour  |
| vii. Pod length                | : | 11.00 - 15.00 cm  |
| Range                          | : |   |
| Mean                           | : | 11.01 cm  |
| Seeds                          | : |   |
| i. Seeds/pod                   | : | 12-14   |
| ii. Seed shape                 | : | Square  |
| iii. Seed colour               | : | Brownish white  |
| iv. 1000 seed weight           | : | 120.0 - 139.0 g   |
| v. Seed shape                  | : | Square shaped   |
| Days to 50% flowering          | : | 35 days   |
| Days to maturity               | : | 65-70 days  |
| Maturity group                 | : | Early   |

width and 1000 grain weight for CO 6 and COCP 702 were 0.60 cm and 0.63 cm, 0.56 cm and 0.58 cm, 3.0 mm and 5.0 mm and 137.5 g and 139.1 g, respectively. The data showed that COCP 702 variety possessed bolder seeds than CO 6. When standard procedures were adapted for cooking, the cooked weight and volume of COCP 702 (23.0 g, 27.0 ml) were found to be higher than that of CO 6 (21.1 g, 25.0 ml). The cultivar CO 6 took minimum time (55 min) for cooking, but the water absorption was found to be higher in COCP 702 (83 ml) among the two varieties. Leaching loss was noted minimum 2%Bx in cultivar CO 6. Regarding organoleptic characteristics of COCP 702, it scored higher than the check variety CO 6 in colour, appearance, flavour, texture, taste and overall acceptability. The overall acceptability of COCP 702 was 3.88 out of 4.0 as against 3.66 by CO 6 Cowpea (Table 5).

The culture COCP 702 is erect and grows to a height of 40 to 55 cm. The entire description

of the variety is given in Table 6. The seeds are square shaped and seed colour is brownish white. Thousand seed weight is 120 to 139 g. It is suitable for cultivation all over Tamil Nadu, where cowpea is grown. Considering the overall superiority of the culture COCP 702 in grain yield and grain quality, it was released as a new cowpea variety by the State Variety Release Committee, with the name CO (CP) 7 during January 2002 for general cultivation in Tamil Nadu.

References

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