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# CO 6 Greengram : A high yielding yellow mosaic resistant variety

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**Abstract : The greengram genotyope COGG 902 is a hybrid derivative of WGG 37 x CO 5. The culture recorded an average seed yield of 982 kg ha$^{-1}$ with 25.4, 20.4 and 20.7 per cent increased yield over Vamban 1 (783 kg ha$^{-1}$), CO 5 (815 kg ha$^{-1}$) and KM 2 (814 kg ha$^{-1}$) respectively. It showed resistance to yellow mosaic virus. It is suited for sowing during June-July, Sept-Oct, and Feb-March in all the districts of Tamil Nadu except Nilgiris and Kanyakumari. Hence the culture COGG 902 was released as CO 6 green gram for commercial cultivation in Tamil Nadu during 1999.**

*Keywords : CO 6 Green gram, Resistance, Yellow mosaic virus disease.*

## Introduction

Greengram (*Vigna radiata* L.Wilczek, ) is a short duration legume crop primarily grown for its dry seeds. It is known for its easy digestibility and low flatus production compared to other pluses. In Tamil Nadu, it is cultivated in an area of about 1.83 lakh hectares with a production of 0.696 lakh metric tonnes and the average productivity is around 380 kg ha$^{-1}$ (Dixit *et al.* 2000).

The productivity is just above the national average productivity of 360 kg ha$^{-1}$. However the productivity is lesser than that recorded in states like Maharastra (575 kg ha$^{-1}$) Punjab (605 kg ha$^{-1}$), Bihar (561 kg ha$^{-1}$), Andhra Pradesh (447 kg ha$^{-1}$), Uttar Pradesh (428 kg ha$^{-1}$) and West Bengal (390 kg ha$^{-1}$), (Kannaiyan, 2000).

The yield of greengram is unstable over locations and seasons due to susceptibility to environmental stresses and diseases. So to improve the productivity, intensive breeding programme was initiated at Department of Pulses, Coimbatore. This resulted in the evolution of culture COGG 902 and it was released during Janurary 1999 as CO 6 greengram for cultivation in Tamil Nadu.

## Materials and Methods

The COGG 902 greengram culture was evaluated at Department of Pulses, Tamil Nadu Agricultural University, Coimbatore. It is a cross derivative of WGG 37 x CO 5. The crosses were made between these two parents and selection was made from $F_2$ onwards. After attaining homozygocity in $F_5$, the culture COGG 902 and checks were evaluated in station trails at Department of Pulses, Tamil Nadu Agricultural University, Coimbatore from 1993-1995. The culture was tested in multilocation trails during 1995-96, in adaptive research trial and in co-ordinated trials during 1996-97 and 1997-98 in farmers holdings in different districts.

## Results and Discussion

The culture COGG 902 was tested in station trails, multilocation trails, adaptive research trials and co-ordinated trials. The results are presented in Table 1 to Table 4.

The culture COGG 902 was tested in station trials from 1993 to 1995 at Coimbatore. It recorded an average seed yield of 1245 kg ha$^{-1}$, which is 28.3, 19.2 and 28.7 per cent increase over Vamban 1, CO 5 and KM 2 respectively. With respect to seasonwise performance, in Kharif it recorded an average seed yield of 1281 kg ha$^{-1}$ with a per cent increase of 30.6, 28.0 and 28.4 over Vamban 1, CO 5 and KM 2 respectively. During *rabi*, it recorded an average seed yield of 1297 kg ha$^{-1}$ and the percentage increase was 36.0, 25.2, 33.6 over Vamban 1, CO 5 and KM 2 respectively. In summer, the average seed yield was 1157 kg ha$^{-1}$ with an increase of 18.0, 5.5 and 23.9 per cent over Vamban 1, CO 5 and KM 2 respectively (Table 1).

The culture COGG 902 was tested in multilocation trails during *kharif*, *rabi* and summer 1995-96. It recorded an average yield of 768 kg ha$^{-1}$ whereas the check varieties Vamban 1, CO 5 and KM 2 recorded 656 kg ha$^{-1}$, 661 kg ha$^{-1}$ and 687 kg ha$^{-1}$ respectively. It is about 23.2, 33.1 and 26.7 per cent increased seed yield

**Table 1.** Performance of greengram culture COGG 902 at station trials (Coimbatore)

| Season/Year | Seed yield (kg ha$^{-1}$) | | | |
|---|---|---|---|---|
| | COGG 902 | Vamban 1 | CO 5 | KM 2 |
| *Kharif* | | | | |
| 1993-94 | 1144 | 885 | 904 | 890 |
| 1994-95 | 1418 | 1076 | 1089 | 1104 |
| Mean | 1281 | 980 | 1001 | 997 |
| % increase | - | 30.6 | 28.0 | 28.4 |
| *Rabi* | | | | |
| 1993-94 | 1285 | 944 | 985 | 928 |
| 1994-95 | 1310 | 965 | 1088 | 1014 |
| Mean | 1297 | 954 | 1036 | 971 |
| % increase | - | 36.0 | 25.2 | 33.6 |
| *Summer* | | | | |
| 1993-94 | 1098 | 965 | 1068 | 884 |
| 1994-95 | 1216 | 989 | 1125 | 984 |
| Mean | 1157 | 977 | 1097 | 934 |
| % increase | - | 18.4 | 5.5 | 23.9 |
| Overall mean | 1245.2 | 970.5 | 1044.7 | 967.3 |
| Overall % increase | 28.3 | 19.2 | 28.7 | |

**Table 2.** Performance of greengram culture COGG 902 in multilocation trails during 1995-96

| Season/Year | Seed yield (kg ha$^{-1}$) | | | |
|---|---|---|---|---|
| | COGG 902 | Vamban 1 | CO 5 | KM 2 |
| *Kharif* | | | | |
| Coimbatore | 728 | 596 | 564 | 566 |
| Vamban | 528 | 498 | 398 | 512 |
| Mean | 628.0 | 547.0 | 481.0 | 539.0 |
| % increase | - | 14.8 | 30.6 | 16.5 |
| *Rabi* | | | | |
| Coimbatore | 936 | 744 | 680 | 766 |
| Vamban | 768 | 606 | 576 | 628 |
| Vellore | 612 | 506 | 488 | 496 |
| Tindivanam | 636 | 712 | 804 | 617 |
| Pattukottai | 1248 | 1109 | 1014 | 967 |
| Mean | 986.3 | 782.5 | 734.0 | 739.7 |
| % increase | - | 26.0 | 34.4 | 34.4 |
| *Summer* | | | | |
| Coimbatore | 896 | 740 | 709 | 741 |
| Vamban | 528 | 498 | 398 | 512 |
| Mean | 768.5 | 684.0 | 626.5 | 680.5 |
| % increase | - | 12.4 | 22.7 | 12.9 |
| Overall mean | 871.1 | 656.1 | 661.9 | 687.7 |
| Overall % increase | - | 23.2 | 33.1 | 26.7 |

Table 3. Performance of greengram culture COGG 902 in adaptive research trail (yield kg ha$^{-1}$)

| District | No.of Trials | COGG 902 | Vamban 1 | CO 5 | KM 2 |
|---|---|---|---|---|---|
| *Kharif 96-97* | | | | | |
| Dharmapuri | 1 | 775 | 675 | 488 | - |
| Salem | 4 | 813 | 703 | 678 | - |
| Madurai | 1 | 760 | 650 | 825 | - |
| Chengalputtu | 2 | 1040 | 883 | 860 | - |
| North-Arcot | 2 | 829 | 651 | 662 | - |
| Virudhunagar | 5 | 528 | 487 | 568 | - |
| Erode | 5 | 972 | 866 | 787 | - |
| *Kharif 97-98* | | | | | |
| Sivaganga | 3 | 836 | - | - | 369 |
| Tiruvannamalai | 3 | 737 | - | - | 395 |
| Erode | 3 | 1040 | - | - | 417 |
| Salem | 2 | 1236 | - | - | 218 |
| Thanjavur | 2 | 567 | - | - | 426 |
| Dindigul | 2 | 580 | - | - | 443 |
| Namakkal | 4 | 1030 | - | - | 365 |
| Virudhunagar | 1 | 518 | - | - | 350 |
| Tuticorin | 1 | 450 | - | - | 412 |
| Cuddalore | 2 | 620 | - | - | 538 |
| Thiruvallur | 4 | 688 | - | - | 534 |
| Dharmapuri | 2 | 631 | - | - | 554 |
| Tirunelveli | 2 | 856 | - | - | 945 |
| Mean | 50 | 823 | 735 | 714 | 756 |
| *Rabi 1/96-97* | | | | | |
| Madurai | 1 | 737 | 762 | 1000 | - |
| Periyar | 4 | 707 | 726 | 776 | - |
| Tirunelveli | 1 | 760 | 665 | 716 | - |
| South-Arcot | 2 | 859 | 613 | 665 | - |
| *Rabi 2/97-98* | | | | | |
| Sivaganga | 2 | 735 | - | - | 681 |
| Virdhunagar | 3 | 543 | - | - | 609 |
| Pudukottai | 3 | 1392 | - | - | 1148 |
| Cuddalore | 3 | 648 | - | - | 591 |
| Dharmapuri | 3 | 708 | - | - | 738 |
| Salem | 3 | 907 | - | - | 805 |
| Thanjavur | 1 | 442 | - | - | 397 |
| Namakkal | 1 | 1077 | - | - | 1022 |
| Erode | 3 | 1145 | - | - | 969 |
| Tirunelveli | 2 | 780 | - | - | 969 |
| Tiruvannamalai | 2 | 1535 | - | - | 1205 |
| Dindigul | 2 | 786 | - | - | 738 |
| Mean | 36 | 868 | 694 | 768 | 811 |
| *Summer 3/96-97* | | | | | |
| Sivaganga | 2 | 749 | 607 | 688 | - |
| South-Arcot | 2 | 859 | 613 | 665 | - |
| *Summer 3/97-98* | | | | | |
| Namakkal | 2 | 976 | - | - | 951 |
| Tirunelveli | 1 | 900 | - | - | 775 |
| Virudhunagar | 4 | 546 | - | - | 504 |
| Mean | 13 | 745 | 722 | 773 | 670 |
| Overall mean | 99 | 829 | 722 | 739 | 770 |
| Overall % increase | - | - | 14.8 | 12.2 | 7.7 |

**Table 4.** Performance of COGG 902 in All India co-ordinated trails *kharif 1996* and *kharif 1997*

| Sl.No. | Location | Grain yield (kg ha$^{-1}$) | |
|---|---|---|---|
| | | *kharif-1996* | *kharif-1997* |
| 1. | Madhura | 583 | - |
| 2. | Coimbatore | 610 | 910 |
| 3. | Warangal | 905 | 440 |
| 4. | Kathelgere | 992 | - |
| 5. | Berhampur | 507 | 621 |
| 6. | Vamban | - | 560 |
| | Mean | 719 | 632 |

(Source : Annual report of AICRP on MULLARP, *Kharif* 1996 & 1997)

**Table 5.** Morphological characters of COGG 902

| Sl.No. | Character | Range | Mean |
|---|---|---|---|
| 1. | Days to 50% flowering | 26-30 days | 28 days |
| 2. | Days to maturity | 62-67 days | 65 days |
| 3. | Plant height | 35-55 cm | 45 cm |
| 4. | Stem color | Green | Green |
| 5. | Petiole color | Green | Green |
| 6. | Pubescence on stem petiole and pod | Present | Present |
| 7. | No.of branches | 2-4 | 3 |
| 8. | No.of pods per plant | 32-50 | 41 |
| 9. | Pod color | Black | Black |
| 10. | Seed color, size and shape | Medium bold, shiny green with smooth surface | Medium bold, shiny green with smooth surface |
| 11. | 100 grain weight | 3.2 to 3.6 (g) | 3.4 (g) |

**Table 6.** Reaction to stemfly at Coimbaore

| Entry | Stemfly (%) |
|---|---|
| COGG 92 | 2.02 (MR) |
| Vamabn 1 | 2.47 (MR) |
| CO 5 | 1.76 (MR) |
| KM 2 | 1.89 (MR) |

MR-Moderately Resistant

**Table 7.** Reaction of COGG 902 to YMV under field conditions **

| Variety/Culture | YMV in 1-9 scale of disease intensity |
|---|---|
| COGG 902 | 2 |
| CO 5 | 8 |

** Data taken during 1997-98 rice fallow season at Panpozhi village of Tirunelveli district, a hot spot of YMV

over Vamban 1, CO 5 and KM 2 respectively. Considering the seasonwise performance, COGG 902 recorded 628 kg ha$^{-1}$, 986 kg ha$^{-1}$ and 768 kg ha$^{-1}$ during *kharif, rabi* and *summer* seasons respectively and with an increased seed yield of 14.8, 30.6 and 16.5 per cent *(kharif)*, 26.0, 33.4 and 34.4 per cent *(rabi)* and 12.4, 22.7, 12.9 per cent *(summer)* over the checks Vamban 1, CO 5 and KM 2 respectively (Table 2).

Table 8. Incidence of (MYMV) at various locations of India during *kharif* 97 (Scale 1-9) **

| Location | Incidence of MYMV for | |
|---|---|---|
| | COGG 902 (CO 6) | Susceptible check |
| Coimbatore | 12.0 # | 46.7 # |
| Vamban | 1.0 | 9.0 |
| Warangal | 1.0 | 8.5 |
| Kanpur | 3.0 | 5.0 |
| Pantnagar | 1.0 | 8.0 |
| Dholi | 2.0 | 7.5 |
| Kumarganj | 2.0 | 9.0 |
| Ludhiana | 2.5 | 9.0 |
| Badanapur | 3.0 | Not compared |
| Vadodara | 1.5 | 5.5 |

# Percentage incidence

** Consolidated report (Mungbean & Urdbean 1997) of All India Co-ordinated Research on Improvement of MULLARP (pp.20-21)

The culture COGG 902 was tested in adaptive research trials during 1997-98 at farmers holdings. It recorded an average seed yield of 829 kg $ha^{-1}$, with 14.8, 12.2 and 7.7 per cent increased yield over the checks Vamban 1, CO 5 and KM 2 respectively. During *kharif* season, it recorded an average yield of 823 kg $ha^{-1}$, with an increased yield of 12.0, 15.3 and 8.9 per cent over the checks Vamban 1, CO 5 and KM 2 respectively. During *rabi* season, it recorded an average yield of 868 kg $ha^{-1}$, with 25.1, 13.0 and 7.0 per cent increased yield over the checks Vamban 1, CO 5 and KM 2 respectively. During summer season, it recorded an average yield of 745 kg $ha^{-1}$, which is 3.2 and 11.2 per cent increased yield over the checks Vamban 1 and KM 2 respectively (Table 3).

The culture COGG 902 ws tested in All India Co-ordinated trails during *kharif* 1996 and 1997. During *kharif* 1996, it recorded an grain yield of 719 kg $ha^{-1}$. During *kharif* 1997 it recorded a grain yield of 632 kg $ha^{-1}$ (Table 4).

COGG 9902 matures in 62-67 days with the plant height of 35-55 cm. The stem and petiole is green in colour. Pubescence is seen on the stem petiole and pods. Pods are black in colour. Seeds are medium bold, shiny and green in colour with smooth surface. The 100 grain weight is about 3.2 to 3.6 g (Table 5).

The culture COGG 902 is moderately resistant to stemfly (Table 6). It is also resistant to mungbean yellow mosaic virus (Grade 2) while the check CO 5 is more susceptible (grade 8) at Ponpozhi village of Tirunelveli district, a hot spot for yellow mosaic virus disease (Table 7).

When the COGG 902 culture was observed for incidence of Mungbean Yellow Mosaic Virus (MYMV) at various location of India during *kharif* 1997, it is found to be resistant to MYMV in ten locations compared to the susceptible check (Table 8).

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