

CO 4 - A new chickpea variety for Tamil Nadu

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Abstract : The new chickpea variety CO 4 (COG 30) is a high yielding, short duration hybrid derivative developed through a joint TNAU / ICRISAT collaborative research programme. It is a derivative of the cross ICC 42 x ICC 12237. This new culture is a desi type and it matures in 85 days. COG 30 has an erect plant type with high pod numbers and mean grain yield of 1150 kg ha⁻¹ and maximum of 46 per cent higher yield over the check variety CO 3. This variety is superior to CO 3 in field tolerance to root rot. The seeds are bold with good cooking quality and high protein content (29.66 per cent). This variety is recommended for cultivation in black soil area of Coimbatore and Dharmapuri districts during winter season. (*Key Words :* Chickpea, *Cicer arietinum* L., Polygon breeding)

Chickpea or Bengalgram (*Cicer arietinum* L.) is the most important pulse accounting for more than two third of the area and about 40 per cent of the production of pulses in this country. The average annual area and production are about 7-8 million hectares and about 4-5 million tonnes of grain respectively. In Tamil Nadu Chickpea is cultivated as a winter crop in 10,000 ha in the districts of Coimbatore, Dharmapuri and Erode.

Materials and Methods

CO 4 (COG 30) is a hybrid derivative of ICC 42 x ICC 12237 developed through a joint TNAU / ICRISAT collaborative breeding programme by Diversified Bulk Population Breeding Method (DBPB) or Polygon breeding program. The new variety is a desi, bold type similar to CO 3. It matures in 85 days, with 100 grain weight of 30-32 g. It is well adapted to black soil area.

With the objective to develop high yielding, bold seeded, widely adaptable desi variety resistant to root rot disease, hybridization was carried out during 1985 at Patacheru, ICRISAT and segregating progenies at F₂ was raised in a multiple disease sick plot for screening against root rot and fusarium wilt. The screened materials were divided into 4 bulks and tested in 4 locations viz., Coimbatore, Patancheru-1, Patancheru-2 (Andhra Pradesh) and Badnapur (Maharashtra) through polygon breeding method by sharing the genetic materials to different zones from 1986-1989.

Results and Discussion

The variety CO 4 was evaluated from 1992 winter onwards. It has recorded a mean grain yield of 1152 kg ha⁻¹ as against 786 kg ha⁻¹ for CO3 (Table-1). The variety was tested under adaptive research trials during winter season from 1994-97

at Coimbatore and Dharmapuri districts at 39 locations. It has recorded a mean grain yield of 836 kg ha⁻¹ while CO 3 recorded only 740 kg ha⁻¹ (Table 2).

Under All-India Co-ordinated trial conducted from 1993-96 at 22 locations, the chickpea variety CO 4 has recorded 1571 kg ha⁻¹ over the national check variety BDN 9-3 with an increase of 33.2 per cent (Table 3).

The new chickpea variety matures in 85 days with high yield potential. It is an erect type with an average height of 35 cm. The stem is pale green. Leaves are green and imparipinnately compound. The leaflets are hairy with serrated margin and leaves are covered with glandular hairs. The flowers are light pink coloured and veined. The seeds are bold with less or no wrinkles and brown in colour. The 100 seed weight is 30-32 g. The morphological features are furnished in Table 4. This variety is also resistant to root rot disease under natural condition (Table 5) and is recommended for rabi cultivation in the black soil areas of Coimbatore and Dharmapuri districts.

The biochemical analysis of CO 4 indicated a high protein content of 29.6 per cent (Table 6). The results of the cooking quality test and organoleptic evaluation indicated the new chickpea variety CO 4 is on par with CO 3 (Tables 7a, 7b).

The new variety CO 4 is superior to CO 3 in field tolerance to root cause and has desirable plant type with more number of pods per plant. This bold seeded variety is preferred by the farmers due to its high market value.

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Table 1. Performance of CO 4 (COG 30) in Tamil Nadu Agricultural University, Coimbatore.

S.No.	Year and Season	Grain Yield (kg ha ⁻¹)		
		CO 4	CO 3	BDN 9-3
1.	1992-93 Rabi Trial	2408	1475	888
2.	1993-94 Rabi Trial - 1 Rabi Trial - 2	652	553	729
		574	550	-
3.	1994-95 Rabi Trial - 1 Rabi Trial - 2	910	646	333
		1236	855	547
4.	1995-96 Rabi Trial - 1	1000	872	870
5.	1996-97 Rabi Trial	1285	604	653
Mean :		1152	786	670

Per cent increase over CO 3 : 46.6%

Per cent increase over BDN 9-3 : 71.9%

Table 2. Performance of CO 4 (COG 30) in Adaptive Research Trials (ART) (1994 to 1997)

S.No.	Year and Season	Name of Centre and District	Yield Kg ha ⁻¹		
			COG	CO 3	
1.	1994-95	Rabi	Senjeriputtur, Coimbatore	305	220
2.	1994-95	Rabi	Karadivavi, Coimbatore	1166	1333
3.	1994-95	Rabi	Anuppatti, Coimbatore	1582	1515
4.	1994-95	Rabi	Venkitapuram, Coimbatore	800	725
5.	1994-95	Rabi	Anthiyur, Coimbatore	625	535
6.	1994-95	Rabi	Modakkupatti, Coimbatore	840	678
7.	1994-95	Rabi	R. Vellur, Coimbatore	1020	820
8.	1994-95	Rabi	Alamarathur, Coimbatore	900	660
9.	1994-95	Rabi	Podinaickanur, Coimbatore	850	580
10.	1994-95	Rabi	Kovilpatti	216	259
11.	1995-96	Rabi	Ravanapuram, Coimbatore	455	480
12.	1995-96	Rabi	Chinthilupu, Coimbatore	420	475
13.	1995-96	Rabi	Veedampatti, Coimbatore	460	530
14.	1995-96	Rabi	R. Velur (1), Coimbatore	202	161
15.	1995-96	Rabi	R. Velur (2), Coimbatore	316	281
16.	1995-96	Rabi	Avalappampatti, Coimbatore	1390	1100
17.	1995-96	Rabi	Jaggarpalayam, Coimbatore	510	490
18.	1995-96	Rabi	Kathampattypudu, Coimbatore	460	420
19.	1995-96	Rabi	Periyanaickenpalayam, Coimbatore	1174	986
20.	1995-96	Rabi	Veerapandi, Coimbatore	1160	947
21.	1995-96	Rabi	Kallipalayam, Coimbatore	1036	979
22.	1995-96	Rabi	Devaiyampalayam, Coimbatore	1048	996
23.	1995-96	Rabi	Saravanampatti, Coimbatore	1174	987
24.	1995-96	Rabi	Seminandampalayam, Coimbatore	340	163
25.	1995-96	Rabi	Anuppapatti, Coimbatore	960	925
26.	1995-96	Rabi	Neelambur, Coimbatore	1012	810
27.	1995-96	Rabi	Nagarkalandai, Coimbatore	250	300
28.	1995-96	Rabi	Selakarichal, Coimbatore	1440	621
29.	1995-96	Rabi	Mathikonpalayam, Dharmapuri	875	820
30.	1995-96	Rabi	Mathankottai, Dharmapuri	859	785
31.	1995-96	Rabi	Muthugoundankottai, Dharmapuri	895	815
32.	1995-96	Rabi	M. Kuttur, Dharmapuri	948	895
33.	1995-96	Rabi	Thamampatty, Dharmapuri	870	830
34.	1995-96	Rabi	Annamalaipatty, Dharmapuri	899	810
35.	1995-96	Rabi	Bompattinorappur, Dharmapuri	912	830
36.	1995-96	Rabi	Chinnakuppam, Harur, Dharmapuri	445	358
37.	1995-96	Rabi	Vekatasamudram Harur, Dharmapuri	1200	1300
38.	1995-96	Rabi	Kozhimakkanoor, Harur, Dharmapuri	1100	1200
39.	1996-97	Rabi	V. Thirumalaisamy, Periyanaickenpalayam	1500	1250
Mean :				0836	740

Per cent increase over CO 3 : 13.0 per cent

Table 3. Performance of CO 4 (COG 30) in All India Co-ordinated Trials

S.No.	Year / Trial	Zone	Centre	Yield Kg ha ⁻¹	
				COG 30	(National Check BDN 9-3)
1.	1993-94 (IET)	NWPZ	Hissar	3333	1805
2.	1993-94 (IET)	NWPZ	Ludhiana	2535	2014
3.	1993-94 (IET)	CZ	Rahuri	1339	1152
4.	1993-94 (IET)	CZ	Kota	2252	2316
5.	1993-94 (IET)	CZ	Jabalpur	2170	1875
6.	1993-94 (IET)	CZ	Badnapur	1165	849
7.	1993-94 (IET)	CZ	Mauranipur	1660	1284
8.	1993-94 (IET)	CZ	Novsari	2083	1667
9.	1993-94 (IET)	SZ	Raipur	1042	903
10.	1993-94 (IET)	SZ	Coimbatore	1553	402
11.	1993-94 (IET)	SZ	ICRISAT	1549	339
12.	1993-94 (IET)	SZ	Dharwad	2389	2407
13.	1994-95 (AVT-1)	SZ	Dharwad	2097	1764
14.	1994-95 (AVT-1)	SZ	Coimbatore	1236	547
15.	1994-95 (AVT-1)	SZ	ICRISAT	2522	2316
16.	1994-95 (AVT-1)	SZ	Lam	847	567
17.	1995-96 (AVT-2)	SZ	Coimbatore	1000	869
18.	1995-96 (AVT-2)	SZ	Lam	622	520
19.	1995-96 (AVT-2)	SZ	Warangal	850	812
20.	1995-96 (AVT-2)	SZ	Jagthapur	591	453
21.	1995-96 (AVT-2)	SZ	ICRISAT	768	366
22.	1995-96 (AVT-2)	SZ	Gulberga	903	708
Overall mean under All India Co-ordinated trial				1571	1179
Percentage increase over check				33.2%	
Per cent increase over CO 3				: 13.0 per cent	

Table 4. Comparative morphological characters of CO 4, CO 3 and BDN 9-3

S.No.	Character	COG 30	CO 3	BDN 9-3
1.	Plant Height (cm)	35.0	30.0	26.0
2.	No. of branches	4.0	3.0	3.0
3.	No. of pods per plant	45-55	40-50	30.40
4.	Pod yield / plant (g)	20.0	15.0	12.0
5.	Seed yield / plant (g)	11.0	9.0	7.5
6.	100 seed weight (g)	31.0	31.0	14.0
7.	Volume of 1000 seeds (cc)	231	230	115

Table 5. Reaction to Root rot disease of CO 4 (COG 30)

S.No.	Culture	Artificial Condition (%)	Natural Condition (Score)
1.	COG 30	22.2	1 (R)
2.	CO 3	45.0	3 (MR)
3.	BDN 9-3	49.0	3 (MR)

Grade

0 : Free 1 : 0.1 to 5.0 per cent 2 : 5.1 to 10.0 per cent 3 : 10.1 to 25.0 per cent 4 : 25.1 percent and above

Table 6. Biochemical analysis of Chickpea variety CO4 (COG 30)

S.No.	Culture/Variety	Protein content on dry wt. basis (g/100g)
1.	COG 30	29.60
2.	CO 3 (check)	24.33

Table 7a. Cooking quality test

Variety / Culture	Wt. before soaking (g)	Wt. after soaking (g)	Increase in Wt. (g)	Water uptake (ml.)	Cooking time (min)
COG 30	200	407	207	265	18
CO 3	200	415	215	265	19

Table 7b. Organoleptic evaluation

Variety / Culture	Colour & Appearance	Flavour	Texture	Taste	Overall acceptability	Mean
COG 30	8.0	8.5	8.2	8.5	8.5	8.34
CO 3	8.3	8.2	8.2	8.0	8.0	8.14

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Effect of organic manure, biofertilizers, inorganic nitrogen and zinc on growth and yield of rabi rice (*Oryza sativa* L.)

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Abstract : Field experiments were conducted during rabi 1995-96 and 1996-97 to study the effect of organic and inorganic nitrogen with zinc on growth and yield of rice. The study revealed that application of either green manure (*Sesbania aculeata* at 6.25 t ha⁻¹ or FYM 12.5 t ha⁻¹ combined with Azospirillum (2 kg ha⁻¹) significantly increased the growth attributes than the combined application of Azolla (1 t ha⁻¹). Among the levels of N (112.5, 150 and 187.5 kg ha⁻¹) with or without 25 kg ZnSO₄ ha⁻¹, combined application of 187.5 kg N ha⁻¹ + 25 kg ZnSO₄ ha⁻¹ though recorded significantly the higher growth attributes it was comparable with 150 kg N ha⁻¹ + 25 kg ZnSO₄ ha⁻¹. Application of GM with Azospirillum recorded significantly shorter period for 50 per cent flowering, highest number of productive tillers m⁻², filled grains per panicle, panicle length and grain yield (5282 and 5218 kg ha⁻¹) in both the years. Eventhough the highest level of N (187.5 kg ha⁻¹) along with Zn application recorded significantly higher yield attributes and yield (5516 and 5376 kg ha⁻¹) it was comparable with 150 kg N ha⁻¹ with Zn. (**Key Words :** Rice, Organic manures, Biofertiliser, Nitrogen, Zinc, Yield)

Zinc deficiency appears to be the most important nutritional factor limiting growth and yield of wetland rice (*Oryza sativa* L.) next to nitrogen and phosphorus. Importance of zinc has been recognised because it is a major component and activator of several enzymes and involved in various metabolic activities like protein synthesis, carbohydrate metabolism and utilization of nitrogen and phosphorus. Vyas *et al.* (1990) reported synergistic effect between applied nitrogen and zinc. Besides poor available nitrogen, a heavy loss of applied N occurs under rice soils which causes N

and Zn deficiency in soil and result in poor crop production. Hence, the present study was carried out to enhance the production of low land rice by the combined application of organic manures with biofertilisers and inorganic N with Zinc.

Materials and Methods

Field experiments were conducted at Agricultural College and Research Institute, Madurai during rabi 1995-96 and 1996-97 to study the effect of organic and inorganic nitrogen with zinc on growth and yield of rice. The experiment was laid