

## A high yielding Finger millet variety CO(Ra) 14

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**Abstract :** The Finger millet culture TNAU 946 is a cross derivative between Malawi 1305 x CO 13. This is a medium duration culture falling into the maturity group of 105-110 days. This has recorded an overall increase of 9.0 per cent in grain yield (2774 kg/ha) over the check CO 13 (2546 kg/ha) in a total number of 134 trials for the past five years which is 13.3 per cent increase over GPU 28 (2448Kg/ha) and 26.5 per cent increase over the national check HR 374 (2192 kg/ha). The culture TNAU 946 has 8-9 top curved fingers per panicle and 5-9 productive tillers. It endowes with the special attributes of easy threshability, synchronised maturity and non-lodging growth habit. It is rich in seed protein (12.93%), fat (3.5%), crude fibre (3.1%) and calcium (0.66%) with the high flouring capacity (93.0%) and low residual weight (7.0%). Based on colour, appearance, flavour, texture and taste TNAU 946 displayed favourable overall acceptability. This culture is moderately resistance to the major diseases of neck and finger blast with 8.6% and 10.3% damage when compared to national check with 10% and 12.5% of damage respectively. TNAU 946 finger millet culture has been released as a new variety CO(Ra) 14 during 2004 for cultivation during *kharif* as rainfed and *Rabi* / summer as irrigated crop in Tamil Nadu.

### Introduction

Finger millet [*(Eleusine coracana* (L) Gaertn)] is still considered as staple food in many rainfed hilly and tribal areas of India. It is grown in 1.67 million hectare of land in India with an average productivity of 1477 kg/ha. In Tamil Nadu, finger millet or ragi is the most important traditional millet crop grown over an area of 1.2 lakh hectare with the highest productivity of 1909 kg/ha and provides food and nutritional security to the marginal farmers in the rainfed drylands and hilly tribal areas (Anon, 2005). It is a hardy crop with minimum disease and pest problems and assures reasonable economic return even under adverse growing conditions. It has been found that protein of finger millet is biologically complete as in the case of milk. In addition, high calcium, high soluble fibre and polyphenol, high diastatic power of malted grains coupled with starch that is more resistant to hydrolysis than of other cereals, accord finger millet a unique status among food grains (Kalloo, 2004).

Thus, finger millet can be used for producing a variety of nutritionally designed foods from infants to geriatrics. On account of these advantages, ragi can therefore be exploited for use in value added nutritive health foods. Further, in view of the growing importance of finger millet as therapeutic diet and baby food, there is a need to enhance genetic yield potential and evolve a new high yielding variety for ragi growing areas in Tamil Nadu. With this objective breeding work was initiated to increase the production and productivity of finger millet in Tamil Nadu.

### Materials and Methods

The finger millet culture TNAU 946 was evolved at Department of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore. The crosses were made between Malawi 1305 and CO 13 and elite plants were selected from F<sub>2</sub> onwards. They were evaluated for their sustained performance,



**Table 1.** Performance of finger millet culture TNAU 946 in station trials

## (a) Summer (Irrigated)

S.No	Year	No. of trials	Seed yield (Kg/ha)		Straw yield (kg/ha)	
			TNAU 946	CO 13	TNAU 946	CO 13
1.	1998	1	3106	2580	9712	7025
2.	1999	1	3520	3010	10115	8036
3.	2000	1	3432	2978	11403	8712
4.	2001	1	3330	2816	10970	8630
5.	2002	1	3673	3105	11268	10078
	Total	5				
		Mean	3412.2	2897.8	10693.6	8496.2
		% increase over the check CO 13	17.8		25.9	

## b) Kharif (Rainfed)

S.No	Year	No. of trials	Seed yield (Kg/ha)		Straw yield (kg/ha)	
			TNAU 946	CO 13	TNAU 946	CO 13
1.	1998	1	3008	2245	10119	6780
2.	1999	1	3216	2726	11255	8019
3.	2000	1	2959	2519	9876	7520
4.	2001	1	2673	2116	8950	6845
5.	2002	1	2925	2415	9075	7640
	Total	5				
		Mean	2956.2	2404.2	9855.0	7360.8
		% increase over the check CO 13	23.0		33.9	

**Table 2.** Performance of finger millet culture TNAU 946 in multilocation trials

## (a) Kharif

S.No	Location	Seed yield (Kg/ha)			Straw yield (kg/ha)		
		TNAU 946	CO 13	GPU 28	TNAU 946	CO 13	GPU 28
1.	Aruppukottai	3211	3287	2881	-	-	-
2.	Bhavanisagar	3016	2415	2229	9245	7856	7563
3.	Paiyur	2755	2896	2826	7423	7184	8381
4.	Virinjipuram	2337	1798	1643	7026	5998	6635
5.	Ramnad	1975	1548	1663	5815	4859	4319
6.	Kovilpatti*	321	355	391	2150	2240	1965
	Mean	2658.8	2388.8	2248.4	7377.3	6474.3	6724.5
	% increase over check CO 13	11.3			14.0		
	% increase over check GPU 28	18.3			9.7		

\* Since it recorded below state average yield not included for analysis.



**Table 3.** Performance of Finger millet culture TNAU 946 in OFT 2005 (District wise mean)

S.No	District	No. of trial	Grain yield (kg/ha)			Straw yield (kg/ha)		
			TNAU 946	CO 13	GPU 28	TNAU 946	CO 13	GPU 28
1.	Erode	16	2866	2463	2475	8001	6753	6283
2.	Coimbatore	10	2576	2245	2265	6227	5883	5980
3.	Dharmapuri	4	2341	2060	2135	6676	5958	5944
4.	Salem	5	3143	2696	2654	9625	8036	6428
5.	Namakkal	5	3013	2543	2615	9469	8120	8163
6.	Vellore	5	3000	2511	2581	7548	6585	6774
Total		45						
		Mean	2816	2418	2445	7782	6764	6465
		% Increase over CO 13	16.45			15.05		
		% Increase over GPU 28	15.17			20.37		

**Table 4.** Overall Performance of Finger millet culture TNAU 946

S.No	Name of the trial	No. of trial	Grain yield (kg/ha)				Fodder yield (kg/ha)			
			TNAU 946	CO 13	GPU 28	HR 374	TNAU 946	CO 13	GPU 28	HR 374
1.	Research station trial (1998-2002)	10	3184	2651	-	-	10274	7929	-	-
2.	Multilocation trial (2002-2003)	10	2877	2567	2450	-	7997	7068	7139	-
3.	All India Coordinated trials (2000-2003)	69	2217	-	-	2192	8630	-	-	7530
4.	On Farm Trials (2003)	45	2816	2418	2445	-	7782	6764	6465	-
Total		134								
Overall mean			2774	2546	2448	2192	8420	6989	6588	7530
% Increase over CO 13			9.0				20.5			
% Increase over GPU 28			13.3				27.8			
% Increase over HR 374			26.5				11.8			

homozygosity and the culture TNAU 946 was identified as the best. The culture TNAU 946 was evaluated with checks at Millet Breeding Station, Coimbatore starting from 1998 to 2002, multilocation trials during 2002-2003, Onfarm trials during 2003 in farmers' holdings at various districts

of Tamil Nadu in All India Coordinated Trails during 2000-2003. Thus, a total of 134 trials was conducted. Besides, the reaction of the cultures against important pest and disease was screened and as per the standard procedures the grain qualities were analysed.



## Results and Discussion

The evaluation trail data of the culture TNAU 946 from the station trial at Millet Breeding Station, Coimbatore is presented in Table 1. The culture TNAU 946 was tested in Station trails from 1998 to 2002 which recorded grain yield of 3184 kg/ha and fodder yield of 10274 kg/ha where as the check, CO 13 recorded grain yield of 2651 kg/ha and fodder yield of 7929 kg/ha. It gave 17.8 and 25.9 per cent increased grain and fodder yield respectively over the check CO 13 in summer irrigated trails during 1998-2002. At the same time in kharif rainfed conditions the culture TNAU 946 gave 23.0 and 33.9 per cent increased grain and fodder yield respectively over the check CO 13. In six multilocation trails of kharif season the culture recorded 2659 kg/ha of grain yield and 7377 kg/ha of straw yield which was 11.3 and 14.0 per cent increased grain and fodder yield respectively over the check CO 13 and 18.3 and 9.7 per cent increased grain and fodder yield respectively over the national check GPU 28 (Table 2). The performance of the culture in OFT is presented in Table 3. It gave 2816 kg/ha of grain and 7782 kg/ha of fodder yield which was 16.45 and 15.05 per cent increase over the check CO 13 and 15.17 and 20.37 per cent increase over the check GPU 28. In All India coordinated trails the culture 2217 kg/ha grain where as the national check HR 374 gave 2192 kg/ha (Table 4).

### Reaction to pest and diseases

Neck and finger blast are the major disease and the genotypes TNAU 946 moderately resistant to both blast (Table 5) when sown in normal growing season. Similarly, there is no major incidence of pest infection (Table 6).

### Grain quality

This culture is rich in crude protein and calcium content and having acceptable flavor and taste (Table 7).

**Table 5.** Reaction to major diseases

S.No.	Item	TNAU 946	CO 13	GPU 28
1.	<b>Damage Score</b>			
	Neck blast	8.6	10.3	14.3
	Finger blast	10.3	10.3	16.5

Neck and finger blast are the major diseases and the genotype TNAU 946 is moderately resistant to blast.

**Table 6.** Reaction to important insect pests

S.No.	Pests	TNAU 946	CO 13	GPU 28
1.	<b>Damage Score</b>			
	Grass hopper	4.2	5.1	4.8
	Earhead caterpillars	3.4	3.8	3.6
	Myloocerus weevil	1.3	1.2	1.9
	Aphids	3.6	3.3	4.0

There is no major incidence of pest infection in this millet and the pest damage of TNAU 946 is with in the economic threshold level.

### Morphological characters

The culture TNAU 946 matures in 105-110 days and attains 50 per cent flowering in 72 - 75 days after sowing. It has a erect plant type with 115-120 cm plant height. It has purple pigmentation during anthesis. The earhead is semi compact and large with 9-12 fingers which are top curved. The 1000 grain weight is 3.1g. The colour of the grain is copper brown (Table 8).

Considering the superior performance of the culture TNAU 946 over the check varieties namely CO 13 and GPU 28, the culture TNAU 946 was released as a new variety CO(Ra) 14 for large scale cultivation in Tamil Nadu during 2004.



**Table 7.** Quality Characters of TNAU 946

## a. Nutritional Quality characters of TNAU 946

S.No.	Particulars	TNAU 946	CO 13	GPU28	CO 9
1.	Crude protein (%)	12.43	10.54	12.81	11.29
2.	Crude fat (%)	3.50	3.0	2.80	3.00
3.	Crude fibre (%)	31.00	25.00	25.00	20.00
4.	Ca (%)	0.66	0.61	0.64	0.63

## b. Sensory evaluation score for TNAU 946

S.No.	Characteristics	TNAU 946	CO 13	GPU28	CO 9
1.	Colour & appearance	2	3	3	3
2.	Flavour	3	3	3	3
3.	Texture	2	3	3	3
4.	Taste	3	2	3	3
5.	Overall acceptability	3	3	3	3

## c. Flouring capacity

S.No.	Characteristics	TNAU 946	CO 13	GPU28	CO 9
1.	Initial weight (g)	500	500	500	500
2.	Final weight (g)	465	430	440	465
3.	Residues weight (g)	35	70	60	35
4.	Flouring capacity (%)	86	93	93	88

**Table 8.** Varietal descriptors of TNAU 946

S.No.	Descriptors	Measurements
1.	Plant height (cm)	115-120
2.	Culm thickness (cm)	3-5
3.	Productive tillers	8-9
4.	Leaf number	20-22
5.	Flag leaf sheath length (cm)	10-15
6.	Flag leaf sheath width (cm)	3-4
7.	Flag leaf blade length (cm)	23-32
8.	Blade width of flag leaf (cm)	0-5
9.	Leaf blade length (cm)	30-35
10.	Leaf blade width (cm)	2-4
11.	Peduncle length (cm)	8-12
12.	Finger number	9-12
13.	Finger length (cm)	10-12
14.	Finger width (cm)	1-2



S.No.	Descriptors	Measurements
15.	Days to flowering	72
16.	Days to maturity	105 – 110
17.	Thousand grain weight (g)	3.1
18.	Grain yield per plant (g)	36 – 45
19.	Growth habit	Erect
20.	Plant pigmentation at flowering	Pigmented
21.	Culm branching (at dough stage)	Absent
22.	Ear shape ( at dough stage)	Semi – compact (Fingers top curved inside)
23.	Ear Size ( at dough stage)	Large
24.	Finger branching	Absent
25.	Gaps on finger	Absent
26.	Spikelet shattering (at maturity)	Absent
27.	Grains per spikelet (at maturity)	Intermediate (5-7 grains)
28.	Grain covering by glumes (at maturity)	Intermediate
29.	Grain colour (Post harvest)	Copper brown
30.	Grain shape (Post harvest)	Round
31.	Grain surface (Post harvest)	Smooth
32.	Grain uniformity (Post harvest)	Uniform
33.	Pericarp persistence on seed after threshing	Not persistent
34.	Synchrony of ear maturity	Synchronous
35.	Lodging susceptibility at maturity	Low

## References

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