# A New High Yielding Multipurpose Long Poded Tnau Vegetable Cowpea PKM 1

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***Abstract-*** *Twenty four vegetable cowpea genotypes were screened to identify the high yielding, short duration vegetable cowpea. The preliminary yield trial was conducted from 2004 – 2007 and one high yielding genotype (Kanyakumari local) was identified as superior. This genotype was further forwarded along with check variety VBN 2 for conducting MLT and ART. Based on the superiority of this genotype, it was released as a new variety TNAU Vegetable cowpea PKM 1 during the year 2011. This high yielding TNAU vegetable cowpea PKM 1 is the pure line selection from Kanyakumari local. Plants are bushy, if un pinched semi trailing. Pods are in cluster (3 – 4/ cluster), tender; resembling french beans after cooking. First harvest is 38 days after sowing. High yielder 29.73t/ha, which is 28 % higher than the check variety. Individual pod length 46.62 cm, pod weight 23.87 g/ pod. Pods are yellowish green at harvestable maturity. Pods are rich in crude protein and less in fibre , medium maturing crop with a duration of 90- 100 days.*

***Keywords***- Short duration, high yielding, cluster bearing and TNAU vegetable cowpea PKM 1.

## I. INTRODUCTION

Cowpea (Vigna unguiculata L.) is one of the most important species belongs to the family Leguminosae. It is a warm season crop, grown for grain, vegetable, and fodder purposes in moderately humid areas of tropics and sub tropics, although, some varieties show a considerable drought resistance (Muhammad et al. 1993). It can be grown in neutral to acidic soils but cannot tolerate alkalinity. The nutritional value of cowpea lies in its protein contents of 20-40% and a good source of quality minerals and vitamins (Nielsen et al., 1997). Being a legume crop, it improves nitrogen status of the soil (Narayanan and Dabadghao ,1972). Vegetable cowpea is preferred by the Tamil Nadu farmers for cultivating it as an intercrop, rice fallow crop or as a fodder crop since it is a short duration crop and does not require much cultural interventions. The varieties available on vegetable cowpea are very less and all the varieties are with short pods. Hence the present study was under taken at HC &RI, Periyakulam to evaluate the high yielding, cluster bearing vegetable type cowpea.

## II. MATERIALS AND METHODS

250 superior performing homozygous plants from each of twenty four different genotypes were selected evaluated, seeds were collected separately and visually poor, weak and defective progenies were rejected. Among the twenty four genotypes, six best performing genotypes were selected for conducting preliminary yield trial during the year 2004.The genotypes were evaluated for quantitative, qualitative characters and reaction to pest and disease incidences. From the preliminary yield trial conducted, one best performing genotype (Kanyakumary local) has been identified; disease and pest reaction was studied. Presented before HCSM 2007 and got approval for conducting MLT and ART. The superior culture (Kanyakumari local) along with check (VBN 2) variety was forwarded for conducting MLT at 9 different research stations of TNAU and the culture along with check variety was forwarded for conducting ART at different farmers locations .Large scale testing was conducted in the farmers location near Theni and Trichy. Totally 123 trials have been conducted apart from station trials. The morphological, yield parameters have been studied. Reaction to powdery mildew and aphids were tested. The results of the different trials conducted are presented below.

## III. RESULT AND DISCUSSION

The TNAU vegetable cowpea variety PKM 1 was tested in stations from 2004-2007 at Department of Vegetable Crops, HC&RI, Periyakulam. It recorded an average green pod yield of 28.95 t /ha over check variety

Table 1: Performance of TNAU vegetable cowpea PKM 1 at Periyakulam

| Year | Length of pod (cm) | | No. of pods | | Yield (t/ha) | |
|---|---|---|---|---|---|---|
| | PKM 1 | VBN 2 | PKM 1 | VBN 2 | PKM 1 | VBN 2 |
| 2003 June | 46.00 | 19.80 | 24.00 | 20.00 | 21.33 | 7.11 |
| 2004 Feb | 44.14 | 15.80 | 26.00 | 18.00 | 27.67 | 3.11 |
| 2004 June | 49.73 | 14.30 | 30.00 | 15.00 | 33.11 | 3.39 |
| 2005 Feb | 47.04 | 15.25 | 31.00 | 21.50 | 30.50 | 3.33 |
| 2005 June | 47.32 | 22.60 | 25.33 | 24.00 | 27.39 | 4.56 |
| 2006 Feb | 48.35 | 12.98 | 32.00 | 27.00 | 28.44 | 4.39 |
| 2006 June | 49.21 | 13.89 | 30.11 | 28.00 | 29.78 | 6.11 |
| 2007 Feb | 45.25 | 14.52 | 35.00 | 25.15 | 33.89 | 6.28 |
| 2007 June | 46.32 | 24.00 | 26.10 | 20.00 | 28.44 | 4.00 |
| Pooled mean | 47.04 | 17.02 | 28.85 | 22.07 | 28.95 | 4.70 |
| % increase over check | | 63.81 | | 23.50 | | 83.76 |

The TNAU vegetable cowpea PKM1 was tested for different characters along with check variety VBN 2. The length of pod was recorded highest in TNAU vegetable cowpea PKM 1 compared to VBN 2 in all the seasons it was tested (2004 – 2007).The length of pod ranged between 44.14 and 49.21cm in TNAU vegetable cowpea PKM 1, whereas VBN 2 registered the length of pod between 12.98 and 24.00 cm. The mean length of pod in TNAU vegetable cowpea PKM 1 is 63.81 % higher than the VBN 2(Table 1). Similarly the number of pods per plant was also recorded highest in TNAU vegetable cowpea PKM 1 (28.85) compared to VBN 2 (22.07). This was 23.50 % increased number of pods over the check variety. The yield of green pods per hectare was highest in TNAU vegetable cowpea PKM 1(28.95 t/ha) over the check variety VBN 2(4.70 t/ha). This might be due to the increased length of pod recorded in TNAU vegetable cowpea PKM 1which would have increased the weight of pod and the number pod also found to be higher in TNAU vegetable cowpea PKM 1 compared to VBN 2. This might be due to the accumulation of nutrients in TNAU vegetable cowpea PKM 1 compared to VBN 2. Yama et.al (2006) reported that longer pods are the preferred and market appealing character of cowpea and found that the accession IT 86D-798 recorded the highest pod length of 17.46cm. It is one of the major criteria to select better variety for its higher yield and preferable pod size. It is obvious that the longer pods produce more yield than short pods.

Table 2. Performance of TNAU vegetable cowpea PKM 1 in Multiplication Trial 2008 -09

| S. No | Name of the Station | No. of pods / plant | | Pod Length (cm.) | | Yield / Plot (kg) | | Yield (t/ha) | |
|---|---|---|---|---|---|---|---|---|---|
| | | PKM 1 | VBN 2 | PKM 1 | VBN 2 | PKM 1 | VBN 2 | PKM 1 | VBN 2 |
| 1. | Bhavanisagar | 10.40 | 4.25 | 33.30 | 16.64 | 2.23 | 1.47 | 5.93 | 5.44 |
| 2. | Dindivanam | 25.00 | 11.50 | 42.00 | 13.20 | 7.75 | 3.15 | 20.83 | 8.89 |
| 3. | Killikulam | 15.00 | 11.00 | 32.90 | 12.40 | 4.50 | 1.25 | 23.33 | 9.31 |
| 4. | Vaigaidam | 41.00 | 23.00 | 33.30 | 16.20 | 33.70 | 16.30 | 24.00 | 12.60 |
| 5. | Vamban | 25.62 | 23.90 | 33.85 | 15.65 | 9.19 | 7.16 | 6.55 | 5.44 |
| 6. | Paramakudi | 12.60 | 4.80 | 42.50 | 16.40 | 2.56 | 0.62 | 18.00 | 5.00 |
| 7. | Palur | 66.00 | 27.00 | 28.00 | 19.00 | 7.20 | 3.24 | 20.00 | 9.00 |
| 8. | Srivilliputhur | 15.00 | 10.00 | 31.20 | 11.70 | 3.20 | 1.25 | 22.33 | 8.67 |
| 9. | Madurai | 13.80 | 4.20 | 45.40 | 18.40 | 4.65 | 2.32 | 24.00 | 6.53 |
| | Mean | 24.94 | 13.29 | 35.83 | 15.51 | 8.33 | 4.08 | 18.33 | 7.88 |

The performance of TNAU vegetable cowpea PKM 1 was tested in different research stations of TNAU during the year 2008 – 09. In all the locations tested the TNAU vegetable cowpea PKM 1 performed better compared to the check variety. The mean number of pods per plant was highest in TNAU vegetable cowpea PKM 1 (24.94) compared to VBN 2 (13.29). The average length of pod was also found to be highest in TNAU vegetable cowpea PKM 1 (35.83cm) compared to VBN 2(15.51cm). Marketable fresh pod yield is the major determinant variable for selecting a particular variety for its commercialization and income generation capability. The difference among the varieties on marketable fresh pod yield was highly significant. The yield of green pod per plot was recorded to be highest in TNAU vegetable cowpea PKM 1(8.33kg/plot) than VBN 2 (4.08 kg/plot). The highest estimated yield per hectare was recorded in TNAU vegetable cowpea PKM 1(Madurai -24.00 t/ha, Vaigaidam – 24.00 t/ha) compared to VBN 2(Madurai -24.00 t/ha, Vaigaidam – 24.00 t/ha)(Table 2). Similar attribute of highest accumulation of nutrients in TNAU vegetable cowpea PKM 1 would have resulted in increased yield compared to VBN 2. Bhattarai and Subedi (1996) reported that in vegetable cowpea variability was recorded among different genotypes and the types Sarlahi Tane produced the higher pod yield than Prakash.

Table 3.Performance of TNAU Vegetable cowpea PKM 1 in different districts of Tamil Nadu 2009-10

| S.No | Districts of Tamil Nadu | No. of Farmers location | No. of pods / plant | | Pod Length (cm.) | | Yield / Plot (kg) | |
|---|---|---|---|---|---|---|---|---|
| | | | PKM 1 | VBN 2 | PKM 1 | VBN 2 | PKM 1 | VBN 2 |
| 1. | Nagerkovil | 10 | 25.28 | 19.70 | 40.38 | 22.56 | 20.20 | 16.49 |
| 2. | Salem | 10 | 26.11 | 18.33 | 40.12 | 19.72 | 31.48 | 7.97 |
| 3. | Trichy | 10 | 28.72 | 19.02 | 41.00 | 23.73 | 37.08 | 8.03 |
| 4 | Theni | 10 | 25.65 | 20.99 | 41.70 | 21.84 | 33.94 | 7.67 |
| 4. | Perambalur | 11 | 26.64 | 21.85 | 40.39 | 22.53 | 15.08 | 12.46 |
| 5. | Thiruvallur | 10 | 28.76 | 18.81 | 40.25 | 21.09 | 15.08 | 12.30 |
| 6. | Ariyalur | 10 | 29.55 | 18.44 | 38.99 | 21.20 | 38.99 | 8.13 |
| 7. | Madurai | 12 | 26.67 | 20.45 | 37.18 | 20.19 | 15.50 | 12.50 |
| 8. | Dindigul | 10 | 25.15 | 17.59 | 40.90 | 18.11 | 30.27 | 5.28 |
| 9. | Viruthachalam | 10 | 31.73 | 23.35 | 38.53 | 18.83 | 20.20 | 16.49 |
| | **Mean** | **103** | **27.43** | **19.85** | **39.94** | **20.98** | **26.93** | **9.96** |

In order to conduct adoptive research trial, the vegetable cowpea was tested along with check variety in different districts of Tamil Nadu in farmers locations. It was tested in 103 farmers locations in nine districts. The number of pods per plant was found to be highest in TNAU vegetable cowpea PKM 1(31.73) compared to VBN 2(23.35).The length of pod was highest in TNAU vegetable cowpea PKM 1 compared to VBN 2. Similarly the highest yield per kg was recorded in the type TNAU vegetable cowpea PKM 1 (20.20 t/ha) compared to VBN 2(16.49 t/ha)(Table.3). Farmers preferred green colour, big and long size with tender and fibreless pods for home consumption and also consumer's preferred characters for the market. The average production cost and income of cowpea was calculated it was Rs. 52,000/ha and the benefit cost ratio was 2.40. Because of all positive characters, farmers preferred TNAU vegetable cowpea PKM1 (Green) for commercial production. Therefore,

this variety was released for commercial production in different districts of Tamil Nadu.

Table 4.Overall performance of TNAU vegetable cowpea PKM 1

| Particulars | No. of trials | Green pod yield (t/ha) | |
|---|---|---|---|
| | | PKM 1 | VBN 2 |
| HC & RI, Periyakulam | 9 | 28.95 | 4.70 |
| MLT | 9 | 18.33 | 7.88 |
| ART/OFT | 103 | 26.93 | 9.96 |
| Large scale demonstration | 2 | 26.37 | 9.67 |
| **Mean** | **-** | **25.15** | **8.05** |

Inorder to evaluate the performance of vegetable cowpea PKM 1 different trials viz., yield trials at HC &RI, Periyakulam(9), MLT at different research stations(9), ART at farmers locations(103) and large scale trials(2) have been conducted. In all the trials conducted the green pod yield was found to be higher in PKM 1(25.15 t/ha) than VBN 2 ( 8.05 t/ha)(Table 4).

Table 5. Reaction of TNAU vegetable cowpea PKM 1 for powdery mildew

| Hybrids / Check | Reaction to Powdery Mildew | | Reaction to aphids | |
|---|---|---|---|---|
| | Percent of disease infection | Reaction | Percent of disease infection | Reaction |
| TNAU vegetable cowpea PKM 1 | 12.50 | Moderately resistant | 20.56 | Vegetable cowpea is susceptible to aphids infestation and this culture is slightly affected by aphids population |
| VBN 2 | 11.80 | Moderately resistant | 32.14 | Susceptible to aphids |

The reaction to pest and disease incidence was studied for TNAU vegetable cowpea PKM 1 and VBN 2, the powdery mildew incidence was found to be lesser in TNAU vegetable cowpea PKM 1 compared to VBN 2. (Table 5)Similarly the susceptibility to pest was lesser in TNAU vegetable cowpea PKM 1 compared to VBN 2.This might be due to the increased vigour in TNAU vegetable cowpea PKM 1 would have contributed for fewer incidences of powdery mildew and aphids.

Table 6. Nutritive value and cooking quality

| S. No. | Particulars | TNAU vegetable cowpea PKM 1 | VBN 2 |
|---|---|---|---|
| 01. | Moisture content (%) | 88.07 | 80.75 |
| 02. | Fibre content (g) | 0.89 | 1.12 |
| 03. | Dry matter content (%) | 11.93 | 19.25 |
| 04. | Shelf-life | 4 days | 3 days |
| 05. | Overall acceptability | Highly Acceptable | Moderately acceptable |
| 06. | Cooking time | 15 min. | 20 min. |
| 07. | Weight after cooking | 42.13g | 34.19 g |

The nutritive value interms of moisture, fibre, crude protein, dry matter content were found to be highest in TNAU vegetable cowpea PKM 1 compared to the check variety. The shelf life of pods was also found to be one day ahead compared to VBN 2. The weight after cooking was more in TNAU vegetable cowpea PKM 1(42.13g) than VBN 2(34.19 g)(Table 6).

## SUMMARY

In order to identify the high yielding vegetable type cowpea, different trials have been conducted at HC &RI, Periyakulam from 2004 to 2007, multi location trial was conducted at different research station during 2008-2009 and adoptive research trial and large scale demonstrations were conducted during 2009-10. In this study a high yielding long poded, short duration TNAU vegetable cowpea PKM 1 was selected and it was released during 2011 for commercial cultivation.

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