



# ADOPTION OF SPIRAL GRADER AS A VALUE ADDITION TOOL IN PIGEONPEA PRODUCTION

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## Abstract

The rainfed areas of Raichur have tremendous potential for expansion of high-yielding short- and medium-duration pigeonpea varieties and hybrids. However, the majority of farmers in these rainfed upland ecosystems do not have access to improved Pigeonpea cultivars and management practices including value addition. Value addition to any produce has been a bonus to the farmers. A simple device called spiral grader/seperator grading the Pigeonpea with centrifugal force was introduced to the pigeonpea growing farmers in Raichur district as a component of Integrated Crop Management (ICM) strategies. These Front Line Demonstrations (FLDs) were conducted in different villages of Raichur district for three years from 2013 to 2017. A total number of 925 farmers from 23 villages used this tool on community sharing basis for value addition to Pigeonpea through grading. With grading alone farmers could realize about 250-300 as an additional income. The results imply that, along with front Line Demonstrations, grader needs to be supplemented as a critical input of ICM.

**Key words :** Spiral grader, pigeonpea, value addition, Front Line Demonstrations (FLDs).

## Introduction

Pigeonpea (*Cajanus Cajana* (L.) Millsp) is one of the major food legume crops of both tropics and subtropics. It is drought tolerant and exhibits a large variation for physiological maturity. Pigeonpea cultivated in a total area of 4.92 million ha, globally, with an annual production of 3.65 million tons (mt) and productivity of around 900 kg/ha. India has 3.90 mha ( $\approx 80\%$  of world acreage) with a total production and productivity of 2.89 mt ( $\approx 79\%$  of world production) and around 750 kg/ha, respectively (<http://www.faostat.fao.org>). The productivity is 150 kg/ha lower compared to global average. This crop has a wider adaptation to a range of environments and cropping systems. North Karnataka, especially Hyderabad Karnataka region is known for pulse production especially the Gulbarga region is known as Pulse bowl of Karnataka. Among pulses, it is Pigeonpea which occupies major share. Hot arid climate of Raichur is most suitable for Pigeonpea cultivation. According to the Agricultural Department statistics the area under red-gram cultivation in the Raichur district is expected to go up from 35,000 hectares (ha) in 2015-16

to 70,000 ha during 2016-17. Pigeonpea is a staple pulse in this region.

In spite of many interventions, per capita nutrition supply in India among the lowest in the world (OECD, 2015). Hence, the protein requirement of our population needs to be improved. The gap exists between recommended allowances and consumption of protein (about 10 g). However, the experiences of Krishi Vigyan Kendra reveal that, the farmers are still practicing conventional methods in pigeonpea cultivation through which they get low yields. This is going to fetch them low price. Also there are gaps in productivity due to various reasons, Krishi Vigyan Kendra, Raichur demonstrated Integrated Crop management many villages. The components in ICM included seed treatment, application of herbicides, nipping, inter cultivation, pest and disease management and grading. This paper analyses exclusively, the results of grading, its impact on net returns, savings in labour and adoption of this technique.

## Methodology

The study was conducted in areas with a wide range of socio-demographic mix of people ranging from all age groups, gender, marital status and educational

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qualifications. Front Line demonstration of spiral grader as a tool to value addition to Pigeonpea (*Arhar*) in Rainfed Ecosystems of Raichur was implemented in 2013 to 2017 for a period of four years under the umbrella of demonstration of Integrated Crop management in Pigeonpea. The demonstrations were sponsored by ICAR with a main objective to demonstrate the integrated crop management strategies in pulse production. Before implementation, the problems of farmers in pigeonpea production were elicited through field visits, group discussions, feedback from the departments and farmers. After listing, the problems were prioritized and the suitable alternatives were listed. Among the listed problems value addition and grading were the two important areas where most of the farmers had no knowledge. Keeping this point in view the FLD on ICM was focused on value addition and grading along with regular ICM practices. Spiral separator was demonstrated to the farmers as tool to grading and value addition at the post harvesting stage. This device works on the principle of centrifugal force and does not require any fuel, electricity, or wind/breeze to winnow the produce and can be kept anywhere in a centralized place and used day and night without any time break. This was used on community approach in all the villages where it was demonstrated.

The total of 925 farmers from 23 villages used this device for four years, in four villages namely Hemberal, Muranpur, Kalmala and Purtipli this device was used for more than two years continuously. The labour saved in

terms of man days, time taken to grade and the wastage produced through grading, additional income generated, were the parameters observed. The data are presented year wise.

## Results and Discussion

The results implied that, though there is irregular production of Pigeon pea, the calculations were done to deduct the wastage produced and labour charges, still there was positive returns by using the grader. In the third year though there was reduction in the yield due to drought, still the farmers realized higher income due to escalated prices of Pigeon pea. Moreover, winnowing activity can be aborted by this spiral grader and grader can be conveniently used at any place. Further, pods affected by pod fly also get separated which was a major problem in 2016-17 (long duration varieties).

As part of the demonstration analysis was carried out pigeon pea project such as technologies, benefit cost ratio (BCR), gender participation and other socio-demographic information. Report from the assessment presented problems and constraints faced during project inception and degree of satisfaction to capacity building activities, Information, education and communication (IEC) strategies, degree of satisfaction on roles of key stakeholders, major factors/constraints in the delivery of pigeonpea technologies and diffusion.

Increased women participation was identified to be part of the project activities. The women participants

**Table 1 :** Net returns gained by grading pigeonpea produce during 2013-14.

S. no.	Name of village	No. of farmers	Qty graded (qtl)	Gross income with ungraded Pigeonpea	Wastage produced (qtl)
1.	Muranpur	60	1020	4590000	51
2.	Kalmala	20	330	1485000	16.50
3.	Neelagal	25	540	2430000	27
4.	Hemberal	30	1200	5400000	60
5.	G. Hanumapur	65	1080	4860000	54
6.	Kurdi	50	1290	5805000	64.50
7.	Kallur	25	300	1350000	15
8.	Katletkur	15	345	1552500	17.25
9.	Atkur	20	420	1890000	21
	Total	310	6525	29362500	362.2

Labour charges grading 10q/day/labour with spiral separator. Wastage is calculated @ 5% of the total produce graded.

Pigeonpea cost @ Rs. 4500/qtl for ungraded produce.

A. Labour charges incurred towards grading is 652.5 days labors@ Rs. 200/day=130500

B. Cost of wastage if added to the ungraded Pigeonpea (362.2x4500) = Rs.1629900

C. Total (labour charges+wastage) = Rs. 1760400

E. Gross income with graded Pigeonpea (6525-362.2=6162.8x5600)= Rs.34511680-1760400=32751280

Net Returns=32751280-29362500=3388780

Labour charges for winnowing nil in conventional practice.

Pigeonpea cost @ Rs. 4900/qtl for graded produce.

D. Gross income with ungraded Pigeonpea = Rs. 29362500

**Table 2** : Net returns gained by grading pigeonpea produce during 2014-15.

S. no.	Name of village	No. of farmers	Qty graded (qtl)	Gross income with ungraded Pigeonpea	Wastage produced (qtl)
1.	Purthipli	1	80	440000	4
2.	Muranpur	100	4000	2000000	200
3.	Kalmala	125	250	1250000	12.5
4.	Bevinbenchi	30	180	900000	1.5
	Total	256	4510	22550000	218

Labour charges grading 10q/day/labour with spiral separator. Labour charges for winnowing nil in conventional practice. Wastage is calculated @ 5% of the total produce graded.

Pigeonpea cost @ Rs. 5000/qtl for ungraded produce.

Pigeonpea cost @ Rs. 5600/qtl for graded produce.

A. Labour charges incurred towards grading is 451 labors@ Rs. 200/day=90200

B. Cost of wastage if added to the ungraded Pigeonpea (218x5000) = Rs.1090000

C. Total (labour charges+wastage) = Rs. 1180200

D. Gross income with ungraded Pigeonpea = Rs. 22550000

E. Gross income with graded Pigeonpea (4510-218 qtl=4292 qtlx5600) = Rs. 24035200-1180200=22855000

Net Returns =22855000-22550000=305000

**Table 3** : Net returns gained by grading pigeonpea produce during 2015-16.

S. no.	Name of village	No. of farmers	Qty graded (qtl)	Gross income with ungraded Pigeonpea	Wastage produced (qtl)
1.	Purthipli	15	113	1005700	3
2.	Matamari	12	76	676400	0.72
3.	Muranpur	35	50	445000	1.75
4.	Kalmala	125	189	1682100	6.25
5.	Hembaral	160	900	8010000	8
6.	Askihal	2	180	1602000	0.1
	Total	349	1508	13421200	19.82

Labour charges grading 10q/day/labour with spiral separator. Labour charges for winnowing nil in conventional practice. Wastage is calculated @ 5% of the total produce graded

Pigeonpea cost @ Rs. 8900/q for ungraded produce

Pigeonpea cost @ Rs. 9300/q for graded produce

A. Labour charges incurred towards grading the entire produce is 150.8 \* Rs. 200 =30,160

B. Cost of wastage if added to the ungraded Pigeonpea(19.62x8900) = Rs. 176398

C. Total (A+B) = Rs. 206558

D. Gross income with ungraded Pigeonpea = Rs. 13421200

E. Gross income with graded Pigeonpea (1492.75 q)= Rs. 13882575-(cost of labour+wastage)

Net Returns from graded produce= Rs. 13676017

Net returns from ungraded produce=13421200

Additional income from grading realized is 254817

learned line sowing as well as improved seed storage practices and at the same time participated in various pigeonpea cultural management practices. The respondents were introduced to a number of new technologies like introduction of new high yielding varieties (medium duration, specifically ICPL 14002 (*Asha*) and ICPL 14001 (*Maruti*)), seed rate from farmer practice of 20-25 kg/ha into 12 kg/ha, application of fertilizer (100 kg DAP/ha), application of insecticide, weeding, intercropping and line sowing. It was found that the respondents were benefitted with the introduction of these technologies and a positive result was obtained in their response. A distinct/noticeable increase was seen

in the productivity estimated at 70% as against landraces and in net income approximately 170-190% of the respondents after the adoption of the aforesaid technologies in the management practices of pigeonpea. Gleaned from the summary table on project benefit, the investment gain is approximately 308% or four times the investment for IPPT and SP components.

### Conclusion

As a whole, the results obtained till date are very promising and suggestions like more training and exposure, organized marketing scheme, hybrid trials, etc, are under consideration and to be implemented accordingly. The

**Table 4 :** Net returns gained by grading pigeonpea produce during 2016-17.

S. no.	Name of village	No. of farmers	Qty graded (qtl)	Gross income with ungraded Pigeonpea	Wastage produced (qtl)
1.	Neeralakeri	5	120	576000	6
2.	Chitranal	2	100	480000	5
3.	Santekellur	2	180	864000	9
4.	Bendoni	1	47	225600	2.35
	Total	10	447	2145600	22.35

Labour charges grading 10q/day/labour with spiral separator.  
Wastage is calculated @ 5% of the total produce graded  
Pigeonpea cost @ Rs. 5,500/q for graded produce

A. Labour charges incurred towards grading the entire produce is  $44.7 * Rs. 200 = Rs. 8940$

B. Cost of wastage if added to the ungraded Pigeonpea( $22.35 \times 4800$ ) = Rs. 107280

C. Total (A+ B) = Rs. 116220

E. Gross income with graded Pigeonpea ( $447 - 22.35q$ ) =  $424.65 \times 5,500 = 2335575 - 116220$  (cost of labour+wastage) = 2219355

Net Returns from graded produce = Rs. 2219355 - 73755

Additional income from grading realized is 73,755

Labour charges for winnowing nil in conventional practice.  
Pigeonpea cost @ Rs. 4,800/q for ungraded produce

D. Gross income with ungraded Pigeonpea = Rs. 21456000

Net returns from ungraded produce = 2145600

**Table 5 :** Year wise gains for farmers through grading pigeonpea.

S. no.	Year	No. of villages	Qty graded (qtl)	Additional income realised
1.	2013-14	9	6525	3388780
2.	2014-15	4	4510	305000
3.	2015-16	9	1508	254817
4.	2016-17	4	447	73755

positive achievements of the project brings to light the need for continuous and increased support for the project not only because of the current investment gain, but also due to projected increase in production especially in Rayagada and Boudh for year 2015 and even in year 2020. This spiral grader can be effectively included in value addition and drudgery reducing technologies.

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