

Transplanting in redgram

for resource effective crop production to unleash the potential yield

**Sunilkumar N M^{1*}, Jyothi Kamthane¹, Ningadalli Mallikarjun¹, Gnyandev Bulla¹,
S B Goudappa², B T Rayudu³ and V Venkatasubramanian³**

¹ICAR-Krishi Vigyan Kendra, Bidar, Karnataka 585 402

²Directorate of Extension, University of Agricultural Sciences, Raichur, Karnataka 584 104

³ICAR-Agricultural Technology Application Research Institute, Bengaluru, Karnataka 560 024

In India, redgram or pigeonpea (Cajanus cajan) is predominantly cultivated in Uttar Pradesh, Madhya Pradesh, West Bengal, Bihar, Jharkhand, Maharashtra, Karnataka, Andhra Pradesh, Telangana, Gujarat, Odisha, Chattisgarh, and Tamil Nadu. It is one of the major pulse crops in Northern Karnataka, covering approximately 5.14 lakh ha with a production of 2.42 lakh tonnes (766 kg/ha). Bidar district, known as the pulse bowl of Karnataka, accounts for a significant share of redgram cultivation, spanning 65,642 ha. However, dry land cultivation of redgram faces various agronomic challenges and inefficient water management, leading to diminishing productivity amidst water scarcity and rainfall uncertainty. Addressing these challenges, ICAR-KVK, Bidar initiated a trial on redgram transplanting after collaborative discussions with progressive farmers and scientists in 2004-05, yielding promising results. Subsequently, ICAR-KVK, Bidar conducted various activities like on-farm trials (OFTs), frontline demonstrations (FLDs), capacity-building programs, and farm advisory services. Through FLDs, redgram transplanting technology was standardized, achieving an average seed yield of 29.70 quintals/ha and net income of ₹ 1,07,240/ha compared to traditional practices, with an average yield of 17.5 quintals/ha and net income of ₹ 58,500/ha during 2009-10 to 2014-15. Adoption of transplanting technology resulted in yield increases ranging from 69.71% to 138% compared to traditional practices. ICAR-KVK, Bidar standardized redgram transplanting technology by preparing healthy seedlings of 30-day-old and transplanting them in the field. This technology adoption led to unprecedented yields, prompting its horizontal spread to 2000 hectares in Bidar district and neighbouring districts of Karnataka, Maharashtra, Telangana, Andhra Pradesh, Odisha, Chattisgarh, and Tamil Nadu. Redgram transplanting offers several advantages including higher yields and income, and has become a resource-efficient crop production approach tailored to the specific needs of small and marginal farmers in dry land farming areas, not only in Bidar district but also across Karnataka and other states nationwide.

Keywords: Gross returns, ICAR-KVK, Net returns, Redgram, Seedlings, Transplanting, Yield

PIGEONPEA (*Cajanus cajan* L. Millsp.) popularly known as tur or arhar is one of the major pulses of the tropics and subtropics endowed with several unique characteristics. It is the most versatile legume crop with diversified uses. viz. food, feed, fodder and fuel. It is the fourth most important pulse crop in the world with almost all production confining to developing countries. It finds an important place in the farming system adopted by small farmers in many developing countries.

In India, pigeonpea or redgram occupies an acreage of 5.05 million ha with a productivity of 859 kg/ha and production of 4.34 million tonnes. India contributed to 77.61% of the global pigeonpea production during 2020. In India, Uttar Pradesh is the leading producer (0.47 million tonnes from 0.49 million ha with a productivity of 944 kg/ha) contributing to 34.87% of the national production (Fourth advanced estimates, DES, MoAF&W, 2022) followed by Madhya Pradesh (0.44

million tonnes, 34.55% of national production), West Bengal (10.53%), Bihar (8.84%) and Jharkhand (4.53%).

Redgram is one of the major pulse crops of Northern Karnataka and cultivated in 5.14 lakh ha with a production of 2.42 lakh tonnes (766 kg/ha). Bidar district is considered as pulse bowl of Karnataka wherein pulses like blackgram, greengram, redgram and bengalgram are major crops comprises 2,06,717 ha. Among these pulses, the share of redgram is to the extent of 65,642 ha. Redgram is one of the most important commercial crops for dryland farmers. However, cultivation of redgram in dry land faces major agronomic constraints like traditional cultivation practices, improper sowing time, inadequate plant population, defective method of sowing, inadequate intercultural operations, inadequate use of phosphatic fertilizers and improper method of application, apart

from water scarcity, uncertainty of rainfall leading to low productivity.

Efforts of ICAR-KVK, Bidar

In an effort to narrow the yield gap, ICAR Krishi Vigyan Kendra, Bidar orchestrated a dynamic convergence between farmers and scientists. This innovative farmers-scientists interface delved into diverse facets aimed at elevating the yield levels of redgram. Amidst the collaborative discussions, progressive farmers and ICAR-KVK scientists forged a collective brainstorming session, ultimately giving rise to groundbreaking notions centered around transplanting and dibbling technology. This symbiotic exchange of insights could possibly transform redgram cultivation, promising a surge in productivity and the fortification of agricultural practices in the region. To assess this



Redgram seedlings



Redgram seedlings in main field



Field visit to redgram transplanting demo plot



Redgram transplanting demo plot



Aerial view of redgram transplanting demo plot



idea, the scientists of ICAR-KVK designed trials about transplanting technology. ICAR-KVK, Bidar laid out a feeler trial during 2004-05 for studying the transplanting method for 50 plants and obtained good results. With this background, during 2005-06, 2006-07 and 2007-08, an on farm testing (OFT) on redgram transplanting was conducted in 22 farmers field which was compared with dibbling and normal sowing method and able to harvest a record yield of 48.75 q per ha.

To demonstrate on larger area and larger adoptability, frontline demonstrations on Transplanting technology in redgram was conducted in an area of 15 ha compared with local practice during 2008-09. Redgram transplanting technology helped to harvest an average seed yield of 29.70 q per ha with

an average gross income and net income of ₹1,24,740 and 1,07,240 per ha, respectively, the cost of cultivation was ₹17,500 per ha. Whereas, it recorded an average yield of ₹17.5 q per ha in traditional practice with an average gross and net income of ₹73,000 and 58,500 per ha respectively and the cost of cost of cultivation in farmers field was ₹15,000 per ha. ICAR-KVK continued conducting further FLDs on redgram transplanting during 2009-10, 2010-11, 2011-12, 2012-13, 2013-14 and 2014-15. All these years, average yield obtained was 27.60 q/ha, gross income of ₹1,13,676/ha and net income of ₹93,176 with transplanted technology whereas it was 15.20 q/ha, ₹62,040/ha and ₹45,540 with farmers practice. Thus, analysis of FLD's data revealed a remarkable 69.71% to 138% increase in yield



Flowering stage



Pod filling stage



Grand growth stage



Farmer with blooming crop

through the implementation of transplanting technology compared to traditional farming practices followed by farmers. Having achieved the significant yield, redgram transplanting technology was standardized by ICAR-KVK, Bidar which includes preparation of seedlings and transplanting of seedlings in main field.

Preparation of redgram seedlings

In the first fortnight of May, the process of preparing seedlings begins with the utilization of 4 × 6 inch polythene bags (150 gauge), requiring approximately 6,050 seedlings per ha. These bags are carefully filled with a pot mixture, creating a conducive environment for germination. The filled bags are then arranged and



Steps involved in redgram transplanting

placed in partial shade, ensuring optimal conditions for the seeds to sprout. Treated seeds are diligently dibbled into the soil, followed by a daily watering routine to nurture the growing seedlings. The process includes regular weeding and aftercare to foster healthy growth. After 30 days, the well-nurtured seedlings are ready for transplantation, marking a critical step in the journey from preparation to the cultivation of robust plants.

Transplanting of redgram seedlings in the field

To cultivate a successful crop, the first step involves land preparation, achieved through a series of essential practices such as ploughing, harrowing, and refining the soil to a fine tilth. Following the onset of the monsoon, furrows are opened at a precise distance of 6 feet apart, creating an optimal environment for the upcoming seedling transplant. Seedlings are then transplanted at a distance of 3 feet, utilizing spot application of FYM (Farmyard manure) or vermicompost. The cultivation process continues with timely weeding and nipping at 30 days after transplanting (DAT). To enhance the crop's nutritional intake, chemical fertilizer is applied using the ring method at a rate of 2.5 bags of DAP (diammonium phosphate) per ha, accompanied by 20 kg of $ZnSO_4$ per ha. Concurrently, proactive plant protection measures are implemented, ensuring the health and vigour of the crop. Irrigation plays a critical role in the cultivation cycle, with crucial stages including flower initiation and pod filling requiring timely watering. Moreover, to mitigate transplanting shock, irrigation is compulsory on the day of transplanting, contributing to the overall success of the cultivation process.

Advantages of redgram transplanting technology

Redgram transplanting technology presents a paradigm shift in agricultural practices, offering a

multitude of advantages that cater to the needs of farmers, especially small and marginal ones.

- The method involves advanced sowing, ensuring optimal planting conditions and leading to reduced pod borer damage due to early and efficient planting.
- The deep rooting characteristic enhances drought resistance, a crucial feature in regions prone to water scarcity.
- Notably, this approach facilitates significant savings in seeds, contributing to cost-effectiveness.
- The ease with which plant protection measures can be implemented adds to its appeal, making it a practical choice for farmers.
- Moreover, the technology promotes increased branching, promising a 2-3 fold rise in yield levels, thereby enhancing overall productivity.
- In essence, redgram transplanting technology emerges as a tailor-made solution, aligning with the specific needs of small and marginal farmers, ultimately fostering sustainable and efficient agricultural practices.

Efforts of ICAR-KVK, Bidar for dissemination of redgram transplanting technology

The Krishi Vigyan Kendra Bidar has implemented a multifaceted approach to disseminate redgram transplanting technology, encompassing various channels and initiatives. A robust framework of 85 training programs has been established to educate and empower individuals with the latest technological knowledge. Additionally, 24 field days serve as interactive platforms for practical learning and hands-on experiences. Exhibitions (23), provide a public showcase for cutting-edge technologies. The dissemination strategy extends to the airwaves with 10 radio programs and 18 television programs, reaching a wider audience. Print media is leveraged through 50 publications, while 20,000 leaflets are distributed to further enhance awareness. A CD has been prepared as a comprehensive resource, complemented by 26 mobile messages for timely updates. Furthermore, the organization actively participates in the sale of 200 quintals of BSMR-736 seeds under a revolving fund. In synergy, these initiatives form a cohesive strategy to bridge the technological gap, further augmented by the inclusion of the university calendar.

Horizontal spread of redgram transplanting technology

The horizontal spread of transplanting technology in redgram in Karnataka has witnessed significant expansion, encompassing a vast area of 2,000 ha in Bidar district. This innovative agricultural practice has not only taken root in Bidar but has also proliferated into neighbouring districts such as Kalaburgi, Koppal, Yadgir, Raichur, Vijayapur, Bagalkot, Haveri, Chickmagalur, and beyond the state borders into Maharashtra, Telangana, Andhra Pradesh, Odisha, Chhattisgarh, and Tamil Nadu. The adoption of transplanting technology has become a catalyst for agricultural advancement, contributing to increased productivity and sustainable farming practices across a diverse geographical landscape.

Recognizing the potential of transplanting technology, redgram farmers in the district have formed associations, envisioning the export of processed dal to neighbouring states and even venturing into international markets. Embracing this cutting-edge technology has positively transformed the living standards of redgram farmers, turning Bidar into the pulse bowl of Karnataka and a symbol of progress and prosperity in agriculture. The district is now witnessing the establishment of numerous redgram processing units thereby creating substantial employment opportunities.

SUMMARY

Redgram is one of the most important commercial crops for dryland farmers in Bidar district of Karnataka. Traditional cultivation practices, improper sowing time, inadequate plant population, defective method of sowing, inadequate intercultural operations, inadequate use of phosphatic fertilizers and improper method of application are the major agronomic constraints due to which productivity is

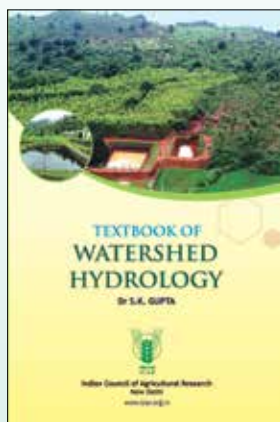
declining. In this regard, ICAR-KVK, Bidar initiated a trial on transplanting of Redgram after a collaborative discussion and brainstorming session with progressive farmers and ICAR-KVK scientists in 2004-05 that led to achieving promising results. Subsequently, ICAR-KVK, Bidar has made efforts and conducted various activities like OFTs, FLDs, capacity building, farm advisories and services. As a result, Redgram transplanting technology was standardized.

The technology involves meticulous process of preparing seedlings through polythene bags and careful germination management, leading to healthy seedlings ready for transplantation after 30 days in the main field. The adoption of transplanting technology has enabled farmers to tap into the maximum yield potentiality of redgram that resulted unprecedented yields than they had previously obtained. Once a neglected crop, redgram has become a major commercial crop through this technology now. Overall, the success of this technology in Bidar district showcases its potential to revolutionize redgram cultivation especially in dryland significantly enhance farmers' livelihoods.

The Redgram transplanting technology has not only taken root in Bidar but has also proliferated into neighbouring districts and beyond the state borders. As redgram transplanting technology offers numerous advantages, it became a resource effective crop production approach to unleash the potential yield of redgram and tailor-made solution that aligns with the specific needs of small and marginal farmers of dryland farming in Bidar district of Karnataka in particular as well as in other districts of Karnataka and other states across the country in general.

*Corresponding author email: nmsunilkumar@gmail.com

TEXTBOOK OF WATERSHED HYDROLOGY



“Textbook of Watershed Hydrology” is an attempt to fill the gap of quality textbooks in one of the major subjects namely the watershed hydrology. It is believed that the principles and practices of watershed hydrology will resolve the national land and water degradation problems.

The textbook is divided into 13 Chapters. Beginning with general introduction to hydrology, it covers the chapter-wise global and Indian water balance, precipitation measurement and analysis procedures.

TECHNICAL ASPECTS

Pages: v + 478; Price: ₹ 1000.00, US\$ 90.00; Postage: ₹50

ISBN No.: 978-81-7164-203-8

For obtaining copies, please contact:

Business Unit

ICAR-Directorate of Knowledge Management in Agriculture
Krishi Anusandhan Bhawan – I, Pusa, New Delhi 110012

Tel: 011-25843657; email: bmicar@icar.org.in, businessuniticar@gmail.com
website: www.icar.gov.in

SCAN QR Code to
Purchase Online

