# SEED PRODUCTION AT SKNAU

## Assessing Current Status & Outlining Future Directions


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Durgapura, Jaipur (Rajasthan) - 302018

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## FOREWORD

I am immensely pleased to know that the Additional Director of Research (Seeds) has compiled an insightful bulletin titled ***"Seed Production at SKNAU: Assessing current status and outlining future directions".*** This comprehensive publication provides detailed information on the seed production of varieties, hybrids and parental lines of various field, vegetable and horticultural crops released by Sri Karan Narendra Agriculture University, Jobner.

Quality seed stands as a cornerstone of agricultural success, characterized by genetic purity, freedom from admixtures, high germination rates, vigour and optimal moisture content. The effectiveness of inputs such as fertilizers, irrigation, and plant protection measures depends largely on the quality of seed used. Providing high-quality seed of improved varieties is a shared responsibility involving multiple stakeholders across the seed value chain. Collaborative efforts from research institutions, seed producers, certification agencies and extension services are essential for maintaining seed integrity, enhancing agricultural productivity and ensuring food security through sustainable farming practices.

Sri Karan Narendra Agriculture University, Jobner, has played a pivotal role in advancing agriculture at both the state and national levels. The University contributes 10-15% of India's total breeder seed production for wheat varieties, 40-50% for barley varieties, and an impressive 65-70% for cluster bean varieties. These contributions underscore the University's critical role in supporting the country's agricultural development and seed production systems.

I sincerely appreciate the dedicated efforts of the Additional Director Research (Seeds) and the team, Sri Karan Narendra Agriculture University, Jobner, in compiling a comprehensive record of quality seed production and distribution at both national and state levels by the SKNAU Jobner. The bulletin, ***Seed Production at SKNAU: Assessing current status and outlining future directions,*** offers valuable insights into Nucleus, Breeder, Foundation, and Certified seeds of various varieties, hybrids, and parental lines in the seed chain, along with their key features. I am confident that this document will serve as a valuable resource for researchers, extension personnel, students, farmers, and other stakeholders.

**(Balraj Singh)**

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## MESSAGE

It gives me immense pleasure to present this bulletin : ***" Seed Production at SKNAU: Assessing current status and outlining future directions",*** which highlights the University's relentless efforts in supporting agricultural advancement through quality seed production. Sri Karan Narendra Agriculture University, Jobner, has played a pivotal role in strengthening the agricultural landscape of Rajasthan by providing high-quality seeds of improved varieties and hybrids of various field, vegetable and horticultural crops. These efforts, combined with best management practices, contribute significantly to ensuring national food security.

I firmly believe that quality seed production is the cornerstone of sustainable agricultural growth. Our commitment at SKNAU is to provide farmers with superior seeds that ensure better yields and resilience against climate challenges. By integrating advanced research and adopting best practices, we aim to empower farmers and strengthen the agricultural ecosystem. Our seed production initiatives are carried out at multiple locations, including COA Fatehpur, ARS Fatehpur, COA Kishangarh Bas, COA Lalsot, SKNCOA Jobner, COA Kumher, ARS Navgaon, ARSS Kumher, RARI Durgapura, ARSS Diggi, ARSS Ajmer and ARSS Gonera. To support these endeavors, eight seed processing units and five godowns have been established for efficient seed processing and storage. The university's contributions span Nucleus, Breeder, Foundation, and Certified seed production for Rabi and Kharif crops. Moreover, three seed hubs for pulses and one for groundnut are actively supplying superior seeds to farmers across the state, enhancing agricultural productivity.

I take this opportunity to extend my sincere appreciation to the Additional Director of Research (Seeds), breeders, researchers, and all collaborators for their dedicated efforts in advancing quality seed production. Their hard work continues to empower farmers, improve livelihoods, and support national goals for food security. I am confident that we will continue to deliver high-quality seeds of improved varieties to farmers across various states of India, which will have a significant impact on improving farmers' livelihoods and contributing to poverty alleviation.

This bulletin, titled ***"Seed Production at SKNAU: Assessing current status and outlining future directions"*** has been compiled and documented with the aim of achieving self-sufficiency in food and feed production. I dedicate this publication to the farmers and researchers across the nations who tirelessly work toward this goal.

(Narendra Kumar Gupta)

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## MESSAGE

It is a great pleasure to present the bulletin ***"Seed Production at SKNAU: Assessing current status and outlining future directions"***, Sri Karan Narendra Agriculture University, Jobner, remains committed to fostering agricultural advancements by producing genetically pure, high-quality seeds. These seeds cater to a wide range of crops varieties. Produced under controlled and standardized conditions, these seeds guarantee high vigor and excellent germination rates, which are essential for achieving optimal yields and ensuring farmer profitability.

Sri Karan Narendra Agriculture University (SKNAU), Jobner, is recognized for its excellence in quality seed production. The Agricultural Research Station (ARS), sub-stations and different colleges plays a pivotal role in producing high-quality seeds for key Kharif crops like moong, urd, til, cowpea and guar, along with Rabi crops such as wheat, barley, gram, mustard, field pea, and mustard. The university has also strategically established eight state-of-the-art seed processing units and five godowns. These facilities support the production of Nucleus, Breeder, Foundation, and Certified seeds for both Rabi and Kharif crops, ensuring high-quality seed availability for farmers. Additionally, we have three seed hubs dedicated to pulses and one specifically for groundnut, all contributing significantly to enhancing the quality seed production in Rajasthan. Through advanced research and innovation, the university ensures the availability of superior seeds tailored to diverse agro-climatic conditions, contributing significantly to agricultural sustainability and productivity.

I extend my heartfelt congratulations to the ADR (seeds), breeders, researchers, and all collaborators for their valuable contributions to this initiative. This bulletin will definitely useful for both farmers and researchers. By providing vital information on seed production, it will play an important role in strengthening food security and promoting sustainable agricultural practices.

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## MESSAGE

It is a great pleasure to present the bulletin ***"Seed Production at SKNAU: Assessing current status and outlining future directions"***. Sri Karan Narendra Agriculture University, Jobner, is dedicated to advancing agriculture through the production of genetically pure, high-quality seeds for a variety of crops. These seeds, produced under proper monitoring, ensure high vigor and excellent germination rates, critical for achieving optimal yields and boosting farmer profitability.

Quality seed plays a vital role in improving agricultural productivity, potentially increasing production by up to 20%. Despite this, only 63% of seed supply reaches farmers through formal systems, while the remaining 37% is sourced from informal sectors, where seed quality may be questionable. To make significant progress in production and productivity, focusing on quality seed is essential, and this bulletin aims to provide the knowledge and techniques needed to produce high-quality seeds.

Our seed production efforts span several key locations, including COA Fatehpur, ARS Fatehpur, COA Kishangarh Bas, COA Lalsot, SKNCOA Jobner, COA Kumher, ARS Navgaon, ARSS Kumher, RARI Durgapura, ARSS Diggi, ARSS Ajmer, and ARSS Gonera. With eight state-of-the-art seed processing units and five godowns, we ensure the production of Nucleus, Breeder, Foundation, and Certified seeds for both Rabi and Kharif crops. Additionally, specialized seed hubs for pulses and groundnut further contribute to enhancing productivity across Rajasthan. I extend my heartfelt gratitude to the ADR (seeds), breeders, researchers, and all collaborators who contributed to this initiative. This bulletin will serve as a valuable resource for both farmers and researchers by providing essential information on seed production, which will support food security and promote sustainable agricultural practices. I am confident this bulletin will be an invaluable tool for researchers, agricultural professionals, and farmers ultimately benefiting the agricultural sector and promoting advancements in technology.

(Harphool Singh)

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## MESSAGE

The production of genetically pure and high-quality seeds is a meticulous task that demands specialized technical skills and precision. To achieve success, seed production must be carried out under standardized and well-organized conditions. Quality seeds serve as carriers of the genetic potential of crop varieties and play a pivotal role in agriculture. They contribute significantly to enhancing farm productivity and ensuring sustainable agricultural practices. Healthy seeds characterized by genetic purity, high seed vigor, and excellent germination rates are essential for maximizing crop yields and improving farmers' profits. The timely availability of quality seeds at reasonable prices is critical to meeting farmers' needs and sustaining agricultural growth.

Sri Karan Narendra Agriculture University, Jobner, is committed to addressing the demand for high-quality seeds by ensuring the availability of superior planting material to farmers. Through structured seed production programs and the dedication of its research and breeding teams, the university continues to contribute to the agricultural development of the region. I would like to express my heartfelt gratitude to the visionary leadership of the worthy Vice-Chancellor of Sri Karan Narendra Agriculture University, Jobner, for his unwavering support and encouragement in preparing this bulletin for various stakeholders. My sincere thanks are extended to all the breeders and contributors who provided valuable information for this publication.

This bulletin owes its successful compilation to the guidance, sincere advice, and continued efforts of our Director of Research. I am also grateful to the Director of the Rajasthan Agricultural Research Institute, Durgapura, and the Deans of the Colleges of Agriculture at Jobner, Fatehpur, and Lalsot. Special thanks are extended to the Zonal Director Research of the Agricultural Research Stations at Fatehpur and Navgaon for their invaluable contributions to this document. I am confident that this bulletin will serve as an invaluable resource for researchers, agricultural professionals, and farmers the ultimate beneficiaries of advancements in agricultural technology.

Spunia.

(Sumer Singh Punia)

# CONTENTS

# 1. Introduction:

## 1.1 About the Office of the Additional Director Research (Seeds)

Sri Karan Narendra Agriculture University, Jobner- Jaipur was established in 2013 by Govt of Rajasthan under Agriculture University, Jobner Act, 2013 (Bill No 39) with a view to impart teaching at the University or college level, conduct research and extension education programmes in the field of agriculture. The territorial jurisdiction and responsibility of this University extend to the districts of Jaipur, Sikar, Alwar, Dausa, Tonk, Ajmer, Bhartpur and Dholpur.

The Directorate of Research was established in November 2013. The Additional Director of Research (Seeds) works under the Directorate of Research, which manages the seed production program for various categories, including nucleus, breeder, and other quality seeds of the university. There are seven research stations encompassing three agro-climatic zones under the administrative control of Directorate of Research, SKNAU, Jobner. These include Rajasthan Agricultural Research Institute (RARI) at Durgapura, Jaipur, two Agricultural Research Stations located at Navgaon (Alwar) and Fatehpur-Shekhawati (Sikar) and four Agricultural Research Sub-Stations at Tabiji (Ajmer), Kumher (Bharatpur), Gonera - Kotputli (Jaipur) and Diggi (Tonk). Rajasthan Agricultural Research Institute, Durgapura is the main Agriculture research station of the University involved in varietal development, maintenance breeding and production of nucleus, breeder and TFL seeds. There are 17 short and long-term AICRP and AINP projects operating in the Directorate of Research. The research grant mainly comes from ICAR & matching grant from the state govt. in proportion of 75:25. Out of these 17 projects, twelve are operating at Rajasthan Agricultural Research Institute, four at SKN College of Agriculture, Jobner and one at ARS Fatehpur-Shekhawati. The research is being conducted on most of the crops, such as fruits, vegetables, and other crops suitable for this region. The university produces high-quality seeds for various agricultural crops, vegetables, and other plants specifically tailored for this region. Seed production programs are also carried out at Krishi Vigyan Kendras (KVKs) and university colleges. The university has approximately 879.43 hectares of land available across various units to conduct research and seed production activities.

## 1.2 Mandates

- Enhanced productivity and quality through basic and strategic seed production activities in the field and horticultural crops.
- The breeder seed production program of DAC indented varieties for various field and horticultural crops aims to fulfill the requirements of national and state-level agencies.
- Ensure the quality of seeds produced by the various units of the University.

## 1.3 Objectives

- To plan, coordinate, and monitor the quality seed requirements for agro-climatic zones of the University.
- To ensure nucleus seeds production of varieties developed by the University for the sustainable production of breeder seed.
- To develop linkages with national and state-level organizations involved in the seed production activities and fulfill their requirement of quality seed.

• Production of high-quality seeds for farmers within the University jurisdiction.


**Fig. 1.1 : Agro-climatic Zones under SKNAU, Jobner jurisdiction**

## 2. Seed Production Setup

Seeds are fundamental to agriculture and are crucial in ensuring food security, economic stability and environmental sustainability. They are the cornerstone of global food security, containing the genetic potential of crops that affect yield, quality and adaptability to different environmental conditions. A seed carries within it the essence of life, capable of transforming barren soil into flourishing fields. High-quality seeds are crucial in ensuring better germination, disease resistance and tolerance to abiotic stresses like drought and heat, especially in the face of climate change. For farmers, seeds are more than just an input; they promise livelihood, sustenance and growth. Investing in seed conservation, breeding programs and innovative technologies like bio-fortification and genetic modification enhances crop productivity and nutritional value, ensuring sustainable agriculture for future generations. Therefore, seeds symbolize hope, resilience and the potential for a prosperous future.

The key points highlighting the importance of seeds are food security, economic development, and crop improvement as the Seeds serve as carriers of genetic information, enabling the development of new varieties with desirable traits such as disease resistance, drought tolerance, and higher yields, environment sustainability, preservation biodiversity etc.

SKNAU is renowned for its breeder seed production programs for wheat, barley, and cluster beans. We make a significant contribution to the national breeder seed production (Fig. 2.1) programme. At the national level, our University accounts for 11% of India's total breeder seed production for wheat varieties 44% for barley varieties, and an impressive 54% for cluster bean varieties.

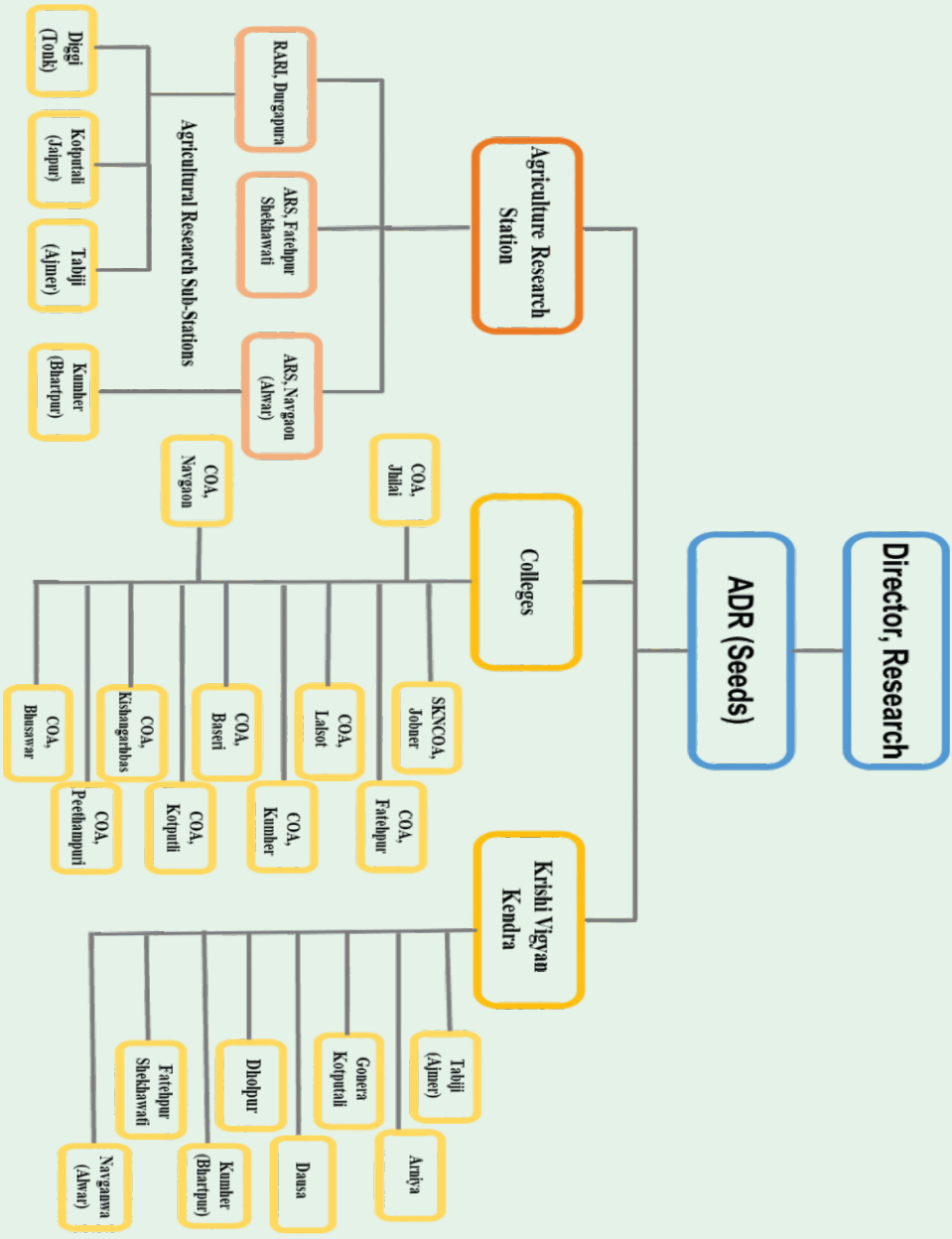



**Fig. 2.1 : Seed production setup of SKNAU, Jobner**

These contributions underscore our crucial role in supporting the country's agricultural development and seed production initiatives.

The University produces over ten thousand quintals of high-quality seeds for various rabi and kharif crops, including cereals, millets, pulses and vegetables. The quality seeds encompass nucleus, breeder, foundation, certified and TFL seeds, catering to the needs of national and state agencies as well as local farmers. The majority, approximately 60-70%, of this quality seed is sourced from the Agriculture Research Station and its sub-stations. The remaining quantity is contributed by KVKs and the University's colleges. (Fig. 2.2)

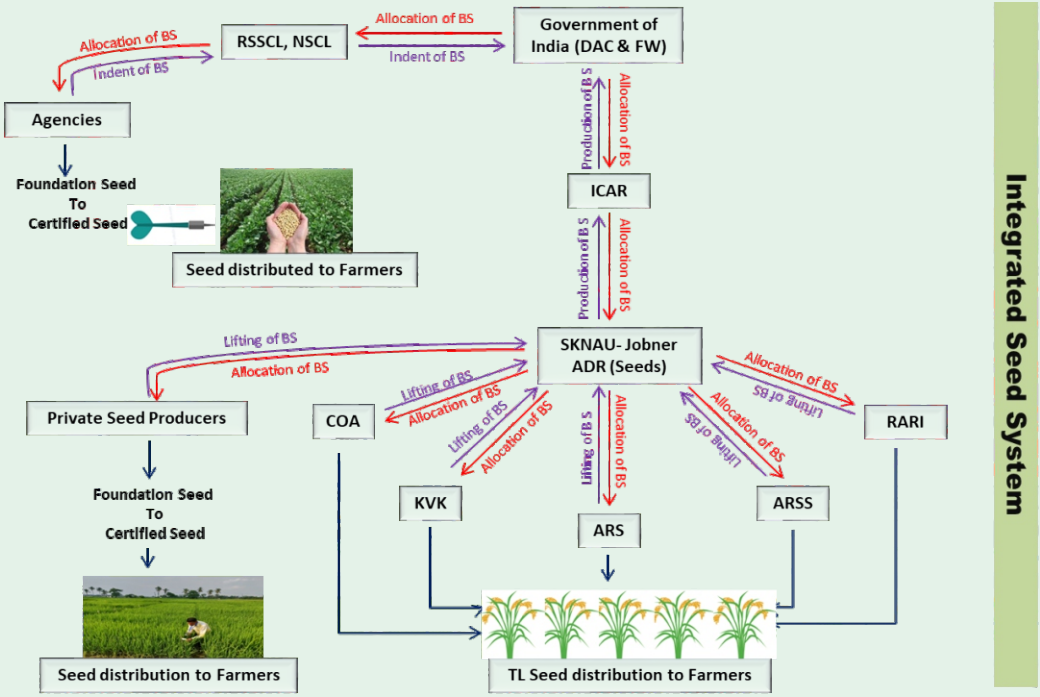



**Fig. 2.2: Seed production and distribution system of SKNAU, Jobner**

## 3. Infrastructure and Equipments

Quality seed production and processing are essential components of any seed production program. Farm implements, processing machinery and seed storage facilities all contribute to the production of high-quality seeds. The personnel involved in processing are well-trained to ensure consistent quality, as each lot may come from different production conditions. The processing plant is continuously upgraded and monitored through a specialized process control system. Seed storage facilities should be constructed according to specific guidelines. They must be waterproof, well-ventilated, and rodent-proof. Additionally, these facilities should include proper drainage systems, facilitate easy loading and unloading and have openings that can be sealed for fumigation purposes.

The enhancement of University farms involved establishing processing units, seed storage, boundary walls and equipping them with tractors and implements, supported by

following three major projects.

1.Establishment / strengthening of seed processing and storage units at different Station of SKNAU, Jobner for seed (RKVY 1)

2.Enhancing Breeder Seed Production (EBSP) of millets under NFSM-Nutricereals

3.Enhancing breeder seed production (EBSP) for increasing indigenous pulses of India.

Under the RKVY 1 project, financial support was provided for the establishment of eight seed processing units amounting to ₹148.28 lakhs and five seed godowns worth ₹123.97 lakhs. Five scientific seed storage godowns were set up at the following locations: SKNCOA Jobner, ARS Navgaon, Alwar, ARSS, Diggi, ARSS, Kumher, and ARSS, Gonera (Kotputali) (Table 3.1).

To enhance the infrastructure for seed processing, five fixed processing units were established at ARS Fatehpur, ARSS Kumbher, SKNCOA Jobner, ARS Navgaon, and RARI Durgapura. Additionally, three portable seed processing units were created at ARSS Goner (Kotputali), RARI Durgapura, and COA, Lalsot (Dausa) to improve seed processing capabilities for these centers and others within the University. (Fig. 3.1 to Fig. 3.7)

The development of seed processing and storage facilities under RKVY 1 has enabled University centers to boost their seed production, thereby increasing the availability of quality seeds for farmers. The installation of the new processing units has led to greater seed processing output and enhanced seed quality for farming communities. Below are the details of the seed processing units and seed godowns established at various centers of the University.

**Table 3.1: Infrastructures and farm equipments created under RKVY 1 project**

| S.No. | Items | Name of the Centre |
|---|---|---|
| 1 | **Seed Godown** | SKNCOA, Jobner |
| | | ARS Navgaon, Alwar |
| | | ARSS, Diggi |
| | | ARSS, Kumher |
| | | ARSS, Gonera-Kotputli |
| 2 | **Processing Units** | ARS, Fatehpur |
| | | ARSS, Kumher |
| | | SKNCOA, Jobner |
| | | ARS, Navgaon |
| | | RARI, Durgapura |
| | | ARSS, Gonera-Kotputali (Portable) |
| | | RARI, Durgapura (Portable) |
| | | COA, Lalsot (Portable) |

Fig 3.1 : Seed Godown and Processing Unit at ARS, Navgaon (Alwar)

Fig 3.2 : Seed Processing Unit, at ARS, Fatehpur (Sikar)

Fig 3.3 : Seed Godown at ARSS, Diggi

Fig 3.4 : Seed Godown and Processing Unit at ARSS, Kumher

Fig 3.5 : Seed Godwon and Seed Processing Unit at ASRSS, Gonera-Kotputli

Fig 3.6 : Portable Processing Unit, RARI Durgapura


Fig 3.7 : Seed Processing Unit at SKNCOA, Jobner

## Table 3.2 : Infrastructures and farm equipments created under EBSP on millets

| Infrastructure | Amount (in Rs. lakh) | Remarks |
|---|---|---|
| Seed Godown/storage area/works | 50.0 | Boundary wall at Mundota Farm |
| Tractor with farm implements | 18.0 | Two tractor purchased and hand over to Asalpur farm and RARI, Durgapura |
| Farm equipment | 1.98 | Sprinkler system handed over to RARI, Durgapura |

**Fig 3.8 : Sprinkler system at RARI, Durgapura**

**Fig 3.9 : Tractors handed over to Asalpur, Farm and RARI, Durgapura**

## Table 3.3: Infrastructures and farm equipments created under EBSP on Pulses

| Work/Particulars | Fund Allocated (Lakh) | Remarks |
|---|---|---|
| **Works** | | |
| Seed Godown | 45.00 | RARI, Durgapura |
| Chain Link fencing | 40.00 | RARI, Durgapura |
| **Seed Processing Plant** | | |
| Hydraulic bag stacker | 3.00 | - |
| Packing Machine | 1.00 | - |
| **Farm Implements** | | |
| Combine harvester | 30.00 | - |
| Two Tractors | 14.00 | ARSS, Kumher and ARS, Navgaon |
| One Carriages | 14.00 | RARI, Durgapura |

**Fig 3.10 : Carriage handed over to RARI, Durgapura**

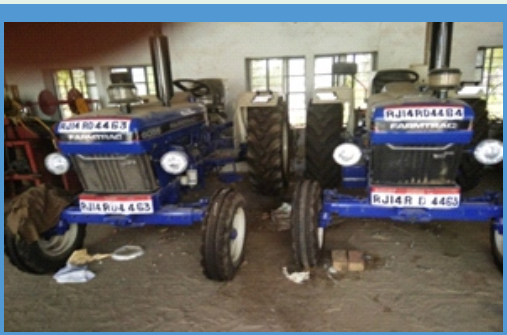


**Fig 3.11: Tractors handed over to ARSS, Kumher and ARS, Navgaon**

Fig 3.12 : Chain Link fencing at RARI, Durgapura


Fig 3.13: Seed godown at RARI, Durgapura


SKN College of Agriculture, Jobner


SKN College of Agriculture, Jobner

Agriculture Research Sub-Station, Tabiji

SKN College of Agriculture, Jobner

Fig 3.14: Seed Godowns created under MIDH Scheme

## 3. 1 Rain Water Harvesting Ponds

The University jurisdiction covers three agro-climatic Zones i.e. Zone II A, IIIA and III B. Zone II A, the Transitional Plain of Inland Drainage (Sikar), is characterized by sandy loam soils and limited water resources, with low to moderate annual rainfall (300-500 mm). The region experiences significant temperature fluctuations, with scorching summers and cold winters, supporting drought-resistant crops like bajra, moth, and guar. Zone III A, the Semi-Arid Eastern Plain (Jaipur, Ajmer, Tonk, Dausa), features sandy to loamy soils and moderate rainfall (500-700 mm), with better water availability through wells and tanks. The cropping pattern includes wheat, barley, mustard, and gram, with

temperatures varying from moderate to extreme. Zone III B, the Flood-Prone Eastern Plains (Alwar, Bharatpur, Dholpur), is marked by fertile alluvial soils and relatively better water resources, aided by rivers like the Chambal. With moderate to high rainfall (700-1000 mm), this zone supports diverse crops such as rice, wheat, sugarcane, and vegetables. Temperature variations here are less extreme, creating favorable conditions for agriculture. These zones highlight Rajasthan's climatic variability and its impact on agricultural practices.

Zones II A and III A of university jurisdiction are essential for the supply of irrigation water to field crops through tube wells, which are crucial as groundwater is depleting rapidly in these areas. In the Jobner region, many tube wells have either run dry or provide minimal saline water, making them unsuitable for irrigation. Therefore, rainwater harvesting and the establishment of water ponds are imperative for effectively irrigating crop fields. Farm ponds are excavated structures designed with inlets and outlets to collect surface runoff from rain water (Fig. 3.15 to 3.20). They are typically constructed at the lowest point of a farm, allowing for the storage of water that can be used for irrigating seed production plots. The location of the pond is chosen using satellite imagery to identify the area that will maximize water collection. Farm ponds can assist seed-producing institutes in increasing their crop production and profitability by providing a dependable water source. Additionally, they enable farmers to grow more crops throughout the year, even during seasons with limited rainfall.

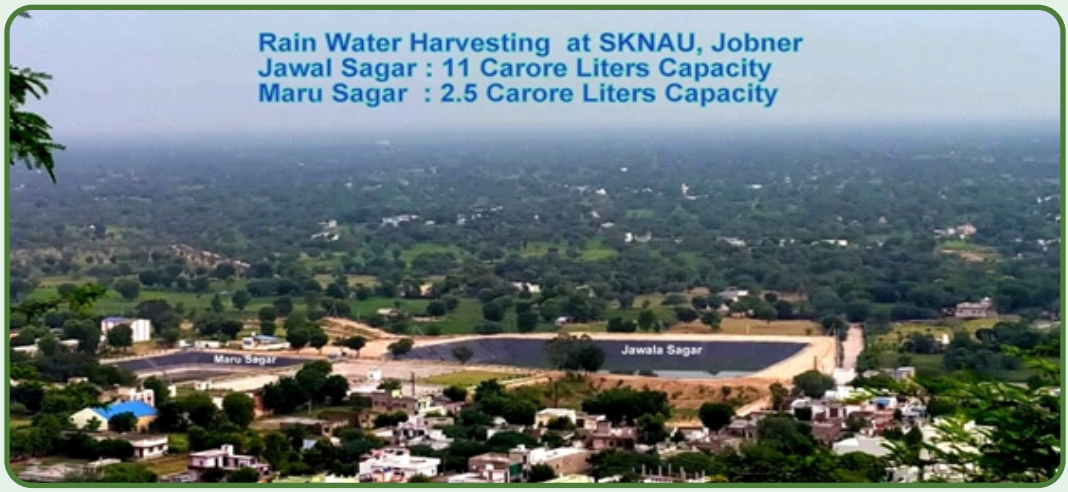



**Fig 3.15 : Rain water harvesting ponds at SKNCOA, Jobner (Total Capacity: 26 Crore Litre)**

**Fig 3.16 : Rain water harvesting pond at COA, Kumher**

**Fig 3.17 : Rain water harvesting pond (old) at ARSS, Kumher**

**Fig 3.18: Rain water harvesting pond at KVK, Kumher**

**Fig 3.19: Rain water harvesting pond (new) at ARSS, Kumher**

**Fig 3.20: Rain water harvesting pond at ARSS, Diggi**

# 4. Quality Seed Production

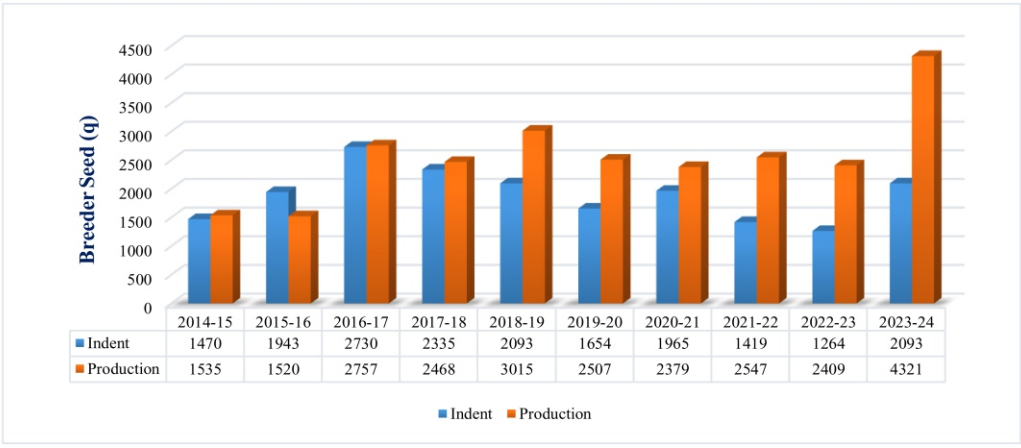
## 4.1 Year and Crop-wise Breeder Seed Production

The year-wise comparison of breeder seed indent (demand) versus production from 2014-15 to 2023-24 (Graph 1 & Table 4 and 5) represents that over the years, the indent has remained relatively stable, with minor fluctuations and a peak of 2,730 quintals in 2016-17. In contrast, production consistently surpassed the indent across all years, ensuring an adequate supply to meet demand. Notably, in 2023-24, production reached its highest level at 4,321 q, nearly doubling the indent of 2,093 q, demonstrating significant surplus capacity (Graph 4.1 & Table 4.1).

The consistent surplus production reflects our University robust seed production capabilities, emphasizing efficiency and preparedness. The peak indent in 2016-17 (2,730 quintal) was closely matched by production (2,757 quintal), highlighting the precision in meeting high demand during critical years. The substantial rise in production from 2,547 q in 2020-21 to 4,321 q in 2023-24 further demonstrates advancements in breeding programs, resource optimization, and technological innovation (Table 4.2). In conclusion, the University has demonstrated its strong capacity to exceed breeder seed requirements consistently, ensuring no shortages even during high-demand years. The increasing production capabilities reflect efficient planning and execution, which positions SKNAU to meet future challenges in seed production. Efforts should now focus on expanding the seed production areas in newly established colleges, addressing the causes of fluctuating demand, and optimizing the program's impact for long-term agricultural sustainability.

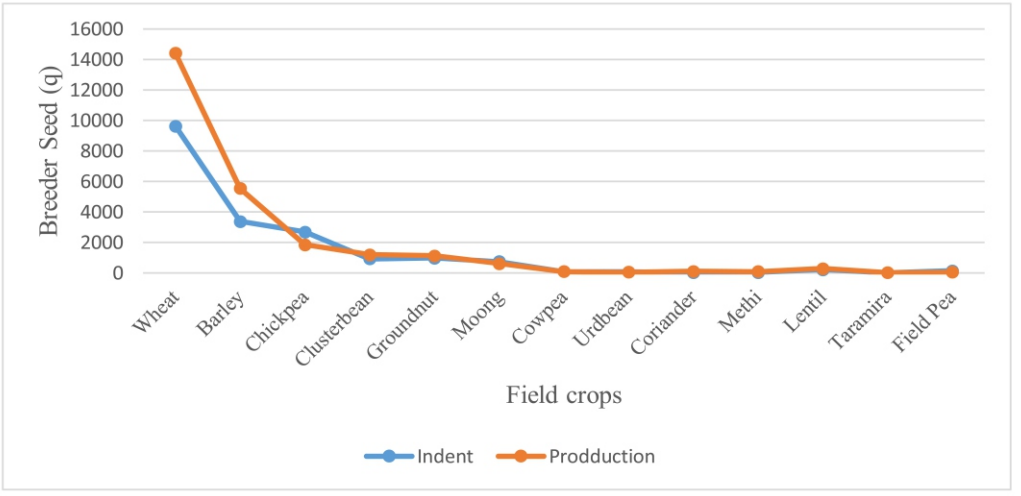
The graph presents the crop-wise comparison of breeder seed indent (demand) versus production for various crops, including wheat, barley, chickpea, cluster bean, groundnut, moong, cowpea, urdbean, coriander, methi, lentil, taramira, and field pea (Graph 2 & Table 4 and 5) shows that wheat has highest indent and production, reflecting its significance as a staple crop. Barley follows with substantial demand and production, consistent with its importance for food, feed, and malt. Chickpea and cluster bean also exhibit notable indent and production figures, emphasizing their role in dietary protein and industrial applications, respectively. (Graph 4.2)

For most other crops, such as moong, groundnut, cowpea, urdbean, and spices like coriander and methi, the indent is relatively low but is consistently met or exceeded by production. This trend highlights the efficient seed production system in place, ensuring the availability of seeds even for less prioritized crops. The balance between indent and production across crops demonstrates SKNAU's ability to align production with demand effectively.




| | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 |
|---|---|---|---|---|---|---|---|---|---|---|
| Indent | 1470 | 1943 | 2730 | 2335 | 2093 | 1654 | 1965 | 1419 | 1264 | 2093 |
| Production | 1535 | 1520 | 2757 | 2468 | 3015 | 2507 | 2379 | 2547 | 2409 | 4321 |

**Graph 4.1: Year-wise breeder seed indent and production**




**Graph 4.2: Crop-wise breeder seed indent and production**

## Table 4.1 : Breeder seed indent (DAC) during 2014-15 to 2023-24

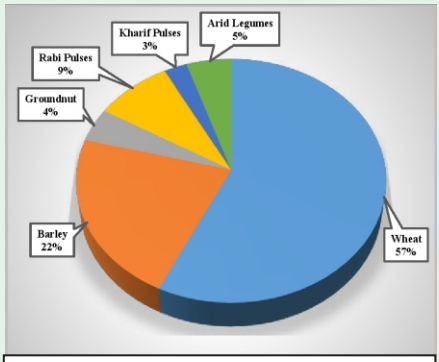
| Crop | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | 567.0 | 696.0 | 1142.0 | 1149.0 | 1193.4 | 816.0 | 1122.4 | 959.2 | 720.4 | 1270.9 | **9636.3** |
| **Barley** | 403.0 | 453.5 | 474.0 | 474.0 | 387.4 | 246.4 | 239.2 | 138.5 | 209.4 | 348.7 | **3374.1** |
| **Chickpea** | 177.0 | 574.0 | 753.0 | 355.0 | 202.5 | 292.1 | 201.0 | 50.2 | 32.3 | 54.5 | **2691.0** |
| **Clusterbean** | 147.0 | 129.5 | 123.1 | 104.9 | 64.7 | 63.2 | 82.1 | 61.1 | 57.5 | 98.1 | **931.2** |
| **Groundnut** | 45.0 | 40.0 | 88.0 | 125.0 | 118.0 | 81.0 | 115.0 | 151.5 | 105.0 | 120.2 | **988.7** |
| **Moongbean** | 80.0 | 41.0 | 130.0 | 70.0 | 84.0 | 52.0 | 144.0 | 25.0 | 63.5 | 48.6 | **738.1** |
| **Cowpea** | 15.0 | 9.0 | 19.0 | 5.0 | 7.7 | 8.0 | 7.7 | 10.0 | 8.5 | 6.5 | **96.4** |
| **Urdbean** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 20.0 | 5.0 | 5.0 | 40.0 | **80.0** |
| **Coriander** | 10.0 | 0.0 | 0.0 | 0.8 | 3.6 | 3.6 | 2.2 | 0.0 | 0.0 | 0.0 | **20.3** |
| **Methi** | 26.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 15.0 | **43.5** |
| **Lentil** | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 | 50.0 | 30.0 | 0.0 | 60.0 | 60.0 | **220.0** |
| **Taramira** | 0.0 | 0.0 | 0.1 | 0.0 | 1.6 | 1.2 | 1.0 | 3.4 | 1.9 | 0.1 | **9.2** |
| **Field Pea** | 0.0 | 0.0 | 0.0 | 50.0 | 10.0 | 30.0 | 0.0 | 15.0 | 0.0 | 30.0 | **135.0** |
| **Total** | **1470.0** | **1943.0** | **2730.2** | **2334.7** | **2093.0** | **1654.1** | **1964.6** | **1418.9** | **1263.5** | **2092.6** | **18964.0** |

**Table 4.2: Breeder seed produced by SKNAU, Jobner during 2014-15 to 2023-24**

| Crop | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | 681.3 | 688.0 | 1287.0 | 1204.0 | 1720.0 | 1243.5 | 1357.1 | 1802.1 | 1656.0 | 2772.1 | 14411.2 |
| **Barley** | 466.0 | 479.0 | 678.0 | 751.5 | 670.0 | 552.4 | 393.1 | 305.9 | 356.6 | 890.7 | 5543.4 |
| **Chickpea** | 195.0 | 127.1 | 402.0 | 152.1 | 259.0 | 321.0 | 226.0 | 68.0 | 17.5 | 85.9 | 1853.8 |
| **Clusterbean** | 72.6 | 125.4 | 158.6 | 145.9 | 110.2 | 97.1 | 131.2 | 134.0 | 66.7 | 162.1 | 1204.0 |
| **Groundnut** | 32.5 | 78.0 | 88.0 | 93.9 | 96.6 | 114.5 | 112.0 | 176.7 | 156.0 | 180.7 | 1128.9 |
| **Moongbean** | 9.0 | 18.5 | 108.8 | 71.0 | 80.1 | 63.1 | 121.0 | 43.5 | 69.7 | 31.9 | 616.8 |
| **Cowpea** | 4.0 | 3.8 | 23.4 | 8.1 | 6.5 | 6.7 | 7.8 | 8.0 | 11.3 | 1.3 | 81.1 |
| **Urdbean** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.5 | 12.5 | 2.0 | 1.3 | 23.0 | 47.3 |
| **Coriander** | 42.0 | 0.0 | 0.0 | 5.5 | 28.6 | 14.4 | 4.4 | 0.0 | 0.0 | 10.2 | 105.0 |
| **Methi** | 33.0 | 0.0 | 11.0 | 34.4 | 0.0 | 3.1 | 0.0 | 0.0 | 0.0 | 13.1 | 94.6 |
| **Lentil** | 0.0 | 0.0 | 0.0 | 0.0 | 33.0 | 60.5 | 7.0 | 0.0 | 70.2 | 123.5 | 294.3 |
| **Taramira** | 0.0 | 0.0 | 0.1 | 0.0 | 1.0 | 4.1 | 6.9 | 4.0 | 3.0 | 2.2 | 21.4 |
| **Field Pea** | 0.0 | 0.0 | 0.0 | 1.4 | 10.0 | 18.3 | 0.0 | 2.5 | 0.0 | 23.6 | 55.8 |
| **Total** | 1535.4 | 1519.9 | 2756.8 | 2467.9 | 3015.1 | 2507.4 | 2379.0 | 2546.8 | 2408.5 | 4320.7 | 25457.9 |

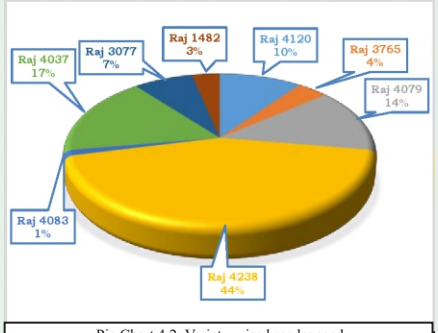
## 4.2 Crop and Variety-wise Seed Production:

The crop-wise breakdown of breeder seed production over the last ten years (Pie Chart 4.1) shows that, wheat is the dominant crop, accounting for 57% of the total production, showcasing its pivotal role in agricultural output. Barley contributes a significant 22%, highlighting its importance as a secondary crop. Groundnut and Rabi pulses collectively make up 13% of the production, with groundnut at 9% and Rabi pulses at 4%, reflecting moderate contributions. Kharif pulses and arid legumes hold the smallest shares, at 3% and 5% respectively. The data underscores the heavy reliance on wheat as a staple crop, with other crops playing supplementary roles in the production.




Pie Chart 4.1: Crop-wise breeder seed production during 2014-15 to 2023-24

The pie chart 4.2 and Table 4.3 depicts the variety-wise distribution of wheat breeder seed production over the last ten years. The variety Raj 4238 dominates production, contributing 44%, making it the most cultivated wheat variety. This is followed by Raj 4037, which accounts for 17%, and Raj 4079, contributing 14%, indicating their substantial roles in wheat production. Raj 4120 makes up 10% of the production, reflecting its moderate significance. Other varieties, including Raj 3077, Raj 3765, Raj 1482, and Raj 4083, contribute smaller shares of 7%, 4%, 3%, and 1%, respectively, signifying their relatively limited adoption due to outdated varieties and susceptibility to rust and smut diseases.

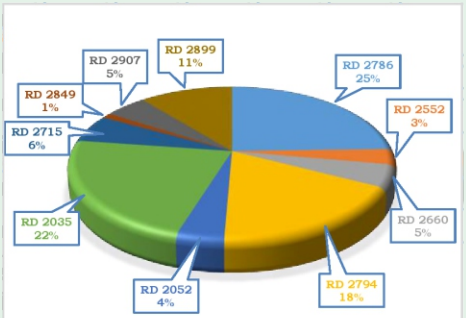



Pie Chart 4.2: Variety-wise breeder seed production of wheat during 2014-15 to 2023-24

**Table 4.3: Variety-wise breeder seed production (q) of wheat during 2014-15 to 2023-24**

| S.No. | Varieties | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Raj 4120** | 222.0 | 431.0 | 250.0 | 162.0 | 67.0 | 27.0 | 107.0 | 170.0 | - | 21.0 | **1457.0** |
| 2 | **Raj 3765** | 51.0 | 33.0 | 12.0 | 48.0 | 120.0 | 55.0 | 39.0 | - | 116.0 | 80.0 | **554.0** |
| 3 | **Raj 4079** | 105.0 | 74.0 | 280.0 | 405.0 | 490.0 | 240.0 | 68.0 | 81.0 | 34.0 | 182.0 | **1961.0** |
| 4 | **Raj 4238** | 95.0 | - | 520.0 | 343.0 | 775.0 | 750.0 | 807.0 | 1140.0 | 920.0 | 936.0 | **6287.0** |
| 5 | **Raj 4083** | 5.0 | - | 30.0 | 56.0 | 53.0 | 25.0 | - | - | - | - | **169.0** |
| 6 | **Raj 4037** | 203.0 | 122.0 | 112.0 | 80.0 | - | 86.0 | 231.0 | 295.0 | 355.0 | 954.0 | **2439.0** |
| 7 | **Raj 3077** | - | 28.0 | 83.0 | 90.0 | 115.0 | 60.0 | 104.0 | 115.0 | 170.0 | 289.0 | **1054.0** |
| 8 | **Raj 1482** | - | - | - | 20.0 | 100.0 | - | - | - | 61.0 | 307.0 | **488.0** |
| | **Total** | **681.0** | **688.0** | **1287.0** | **1204.0** | **1720.0** | **1243.0** | **1357.0** | **1802.0** | **1656.0** | **2772.0** | **14411.0** |

The pie chart 4.3 presents the variety-wise distribution of barley breeder seed production over the last ten years. RD 2786 emerges as the leading variety, accounting for 25% of total production, indicating its strong preference among barley cultivators. RD 2035 follows with a substantial 22% share, demonstrating its importance. RD 2794 contributes 18%, reflecting its significant role in barley production. RD 2899 accounts for 11%, marking it as another widely cultivated variety. (Table 4.4).




Pie Chart 4.3: Variety-wise breeder seed production of barley during 2014-15 to 2023-24

This distribution highlights the dominance of a few varieties, particularly RD 2786 and RD 2035, which together account for nearly half of the production. These varieties offers advantages such as higher yields, disease resistance and better adaptability to regional climatic and soil conditions. The diversity in production shares also reflects efforts to maintain genetic variability and meet specific regional or industrial needs within the barley sector.

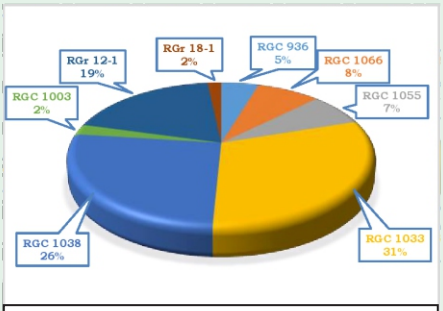
**Table 4.4: Variety-wise breeder seed production (q) of barley during 2014-15 to 2023-24**

| S.No. | Varieties | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **RD 2786** | 113.0 | 112.0 | 300.0 | 289.0 | 230.0 | 190.0 | 33.0 | - | 25.0 | 49.0 | 1341.0 |
| 2 | **RD 2552** | 60.0 | 68.0 | - | 46.0 | - | - | - | - | - | 6.0 | 180.0 |
| 3 | **RD 2660** | 71.0 | 54.0 | 75.0 | 60.0 | 1.0 | - | - | - | - | - | 261.0 |
| 4 | **RD 2592** | 36.0 | - | - | - | - | - | - | - | - | - | 36.0 |
| 5 | **RD 2794** | 48.0 | - | 160.0 | 117.0 | 175.0 | 175.0 | 61.0 | 35.1 | 48.0 | 167.0 | 986.0 |
| 6 | **RD 2052** | 76.0 | 17.0 | 21.0 | - | 50.0 | - | 21.0 | - | - | 43.0 | 228.0 |
| 7 | **RD 2624** | 19.0 | 22.0 | - | - | - | - | - | - | - | | 41.0 |
| 8 | **RD 2035** | 43.0 | 125.0 | 70.0 | 194.0 | 214.0 | 160.0 | 63.0 | 81 | 29.0 | 247.7 | 1227.0 |
| 9 | **RD 2715** | - | 81.0 | 52.0 | 39.0 | - | - | 36.0 | - | 3.1 | 107.0 | 318.0 |
| 10 | **RD 2849** | - | - | - | 6.0 | - | 3.0 | - | 7.0 | 29.0 | 12.0 | 58.0 |
| 11 | **RD 2907** | - | - | - | - | - | 3.0 | 85.0 | 74.0 | 47.0 | 59.0 | 269.0 |
| 12 | **RD 2899** | - | - | - | - | - | 20.0 | 94.0 | 108.0 | 175.0 | 198.0 | 595.0 |
| 13 | **Total** | **466.0** | **479.0** | **678.0** | **751.0** | **670.0** | **552.0** | **393.0** | **305.0** | **356.0** | **890.0** | **5543.0** |

The pie chart 4.5 illustrates the variety-wise distribution of clusterbean breeder seed production over the last 10 years. The variety RGC 1033 holds the largest share, contributing 31% of the total production, followed closely by RGC 1038 at 26%. Together, these two varieties dominate clusterbean production representing more than half of the total share.

This highlights their importance and popularity, potentially due to superior agronomic traits, yield, or farmer preference.

RGR 12-1 accounts for 19% of the total production, making it the third-largest contributor. RGC 1066 and RGC 1055 contribute smaller shares, with 8% and 7%, respectively. Other varieties, including RGC 936 (5%), RGC 1003 (2%), and RGr 18-1 (2%), have minimal contributions to the overall production (Table 4.5). These findings could guide future breeding programs and strategic planning in the promotion of high-performing newly released varieties like RGr 18-1 while addressing the challenges faced by the less cultivated ones.

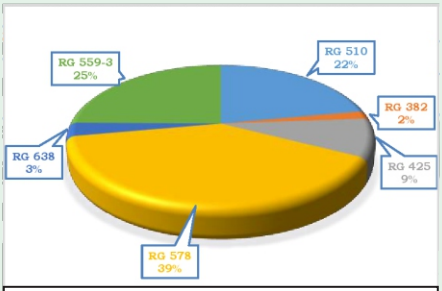



Pie Chart 4.4: Variety-wise breeder seed production of clusterbean during 2014-15 to 2023-24

**Table 4.5: Variety-wise breeder seed production (q) of clusterbean during 2014-15 to 2023-24**

| S.No. | Varieties | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **RGC 936** | 15.3 | 9.0 | 8.6 | 16.0 | 2.1 | - | - | - | - | 3.7 | **54.7** |
| 2 | **RGC 1066** | 7.3 | 10.0 | 38.2 | 6.0 | 2.5 | 1.6 | 2.0 | 3.6 | 7.5 | 14.3 | **93.0** |
| 3 | **RGC 1055** | 2.7 | 22.0 | 30.0 | 18.5 | 5.0 | 1.0 | - | 4.8 | 1.2 | - | **85.3** |
| 4 | **RGC 1033** | 5.0 | 50.0 | 38.0 | 45.0 | 80.0 | 51.5 | 66.2 | 27.0 | - | - | **362.7** |
| 5 | **RGC 1002** | 5.3 | 2.5 | - | - | 1.2 | - | - | - | - | - | **9.0** |
| 6 | **RGC 1038** | 30.0 | 26.9 | 38.1 | 60.0 | 12.0 | 38.0 | 50.0 | 29.6 | - | 23.0 | **307.6** |
| 7 | **RGC 1003** | 5.5 | 5.0 | 5.7 | - | - | 1.0 | - | - | - | 10.0 | **27.2** |
| 8 | **M-83** | 1.5 | - | - | - | - | - | - | - | - | - | **1.5** |
| 9 | **RGC 197** | - | - | - | 0.2 | 0.1 | - | - | - | - | - | **0.3** |
| 10 | **RGC 1017** | - | - | - | 0.2 | 3.3 | 3.0 | - | - | - | - | **6.5** |
| 11 | **RGC 986** | - | - | - | - | 4.0 | 1.0 | - | - | - | - | **5.0** |
| 12 | **RGC 1031** | - | - | - | - | - | - | - | - | - | 8.5 | **8.5** |
| 13 | **RGr 12-1** | - | - | - | - | - | - | 13.0 | 69.0 | 58.0 | 82.6 | **222.6** |
| 14 | **RGr 18-1** | - | - | - | - | - | - | - | - | - | 20.0 | **20.0** |
| | **Total** | **72.6** | **125.4** | **158.6** | **145.9** | **110.2** | **97.1** | **131.2** | **134.0** | **66.7** | **162.1** | **1204.0** |

The pie chart 4.5 and Table 4.6 represents the distribution of groundnut breeder seed production by variety over the last 10 years. Among the varieties, RG 578 has the highest contribution, accounting for 39% of the total production. This is followed by RG 559-3, which makes up 25%, and RG-510, contributing 22%. These three varieties collectively dominate the production, representing a significant majority of the output.




Pie Chart 4.5: Variety-wise breeder seed production of groundnut during 2014-15 to 2023-24

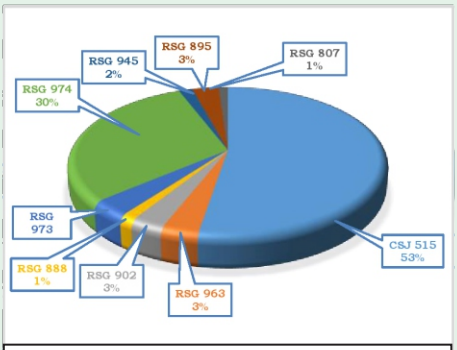
On the other hand, RG 425 accounts for 9% of the total, while RG 638 contributes 3%. The smallest share is held by RG 382, which only constitutes 2% of the production. The distribution highlights the prominence of a few key varieties (RG 578, RG 559-3, and RG 510) in groundnut production, indicating their potential advantages in terms of yield, adaptability, or preference.

Meanwhile, the lower percentages of RG 638 and RG 382 suggest limited cultivation due to very old or newly released varieties.

**Table 4.6: Variety-wise breeder seed production of groundnut during 2014-15 to 2023-24**

| S.No. | Varieties | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **RG 510** | 11.0 | 35.0 | 60.0 | 32.9 | 43.8 | 33.0 | 33.0 | - | - | - | **248.7** |
| 2 | **RG 382** | 20.0 | - | - | - | - | - | - | - | - | - | **20.0** |
| 3 | **RG 425** | 1.5 | 43.0 | 20.0 | 11.0 | 8.4 | 15.0 | - | - | - | - | **98.9** |
| 4 | **RG 578** | - | - | 8.0 | 50.0 | 17.4 | 39.5 | 45.0 | 75.0 | 104.0 | 107.7 | **446.6** |
| 5 | **RG 638** | - | - | - | - | - | - | - | - | - | 35.0 | **35.0** |
| 6 | **RG 559-3** | - | - | - | - | 27.0 | 27.0 | 34.0 | 101.7 | 52.0 | 38.0 | **279.7** |
| | **Total** | **32.5** | **78.0** | **88.0** | **93.9** | **96.6** | **114.5** | **112.0** | **176.7** | **156.0** | **180.7** | **1128.9** |

The cumulative breeder seed production of various chickpea varieties from 2014-15 to 2023-24 totalled 1,749.5 quintals, with significant variability in contributions (Table 4.7). CSJ 515 was the top performer, contributing 916.0 quintals (52.39%) due to its consistently high yields, particularly during 19-20 and 20-21. RSG 974 followed with 527 quintals (30.15%), showcasing stability across multiple seasons. Moderate performers included RSG 973 (61.9 quintals, 3.54%) and RSG 963 (59.0 quintals, 3.38%), while lower contributions were noted for RSG 902 (52.28 quintals, 2.99%), RSG 895 (55.0 quintals, 3.15%), RSG 888 (22.1 quintals, 1.26%), and RSG 807 (19.2 quintals, 1.1%). Minimal shares came from RSG 991, RSG 896, and RSG 931, each contributing less than 0.2% (Pie Chart 4.6). These results highlight the exceptional adaptability and yield stability of CSJ 515 and RSG 974, making them priorities for seed production programs.




Pie Chart 4.6: Variety-wise breeder seed production of chickpea during 2014-15 to 2023-24

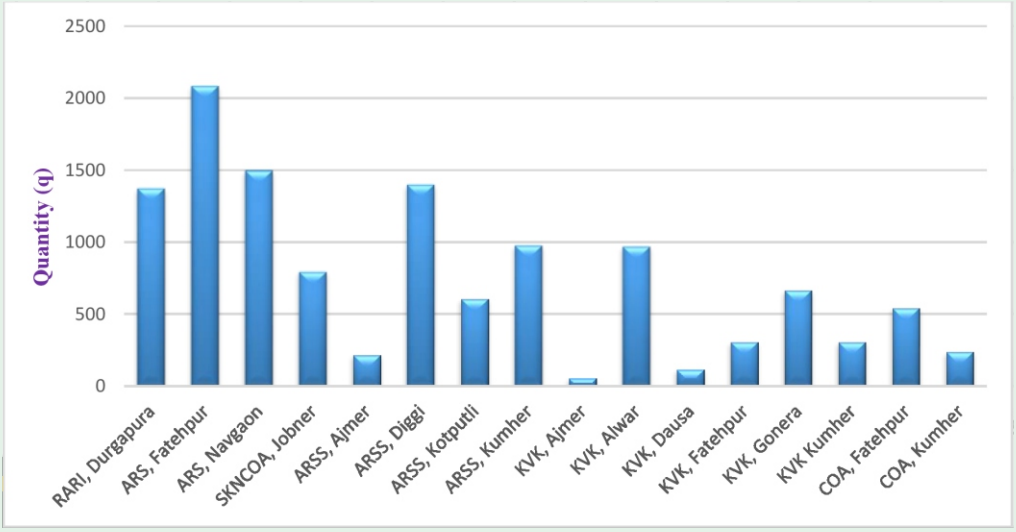
**Table 4.7: Variety-wise breeder seed production of chickpea during 2014-15 to 2023-24**

| S.No. | Varieties | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CSJ 515 | 50.0 | - | 168.0 | 72.0 | 105.0 | 230.0 | 200.0 | 15.5 | 17.5 | 58.0 | **916.0** |
| 2 | **RSG 963** | **32.0** | **-** | **3.0** | **5.0** | **19.0** | **-** | **-** | **-** | **-** | **-** | **59.0** |
| 3 | RSG 991 | 3.0 | - | - | - | - | - | - | - | - | - | **3.0** |
| 4 | **RSG 896** | 3.0 | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3.0** |
| 5 | RSG 902 | 16.0 | 0.2 | 20.0 | 16.0 | - | - | - | - | - | - | **52.2** |
| 6 | **RSG 888** | **18.0** | **-** | **2.0** | **2.1** | **-** | **-** | **-** | **-** | **-** | **-** | **22.1** |
| 7 | RSG 973 | 50.0 | - | 6.0 | - | - | - | - | - | - | 5.9 | **61.9** |
| 8 | **RSG 974** | **-** | 102.0 | **142.0** | **57.0** | **135.0** | 91.0 | **-** | **-** | **-** | **-** | **527.0** |
| 9 | RSG 945 | - | 6.0 | 22.0 | - | - | - | - | - | - | - | **28.0** |
| 10 | **RSG 931** | - | **2.9** | - | - | - | - | - | - | - | - | **2.9** |
| 11 | RSG 895 | - | 16.0 | 39.0 | - | - | - | - | - | - | - | **55.0** |
| 12 | **RSG 807** | - | - | - | - | - | - | 2.0 | - | - | 17.2 | **19.2** |
| | **Total** | **172.0** | **127.1** | **402.0** | **152.1** | **259.0** | **321.0** | **202.0** | **15.5** | **17.5** | **81.1** | **1749.5** |

### 4.3 Center-wise Quality Seed Production

The graph 4.3 titled "Center-wise foundation, certified and TL seed production during 2021-22 to 2023-24" illustrates the contributions of various centers under SKNAU and institutions in producing foundation seed/certified seed/truthfully labelled seed since 2021 (Table 4.8). Among the centers, ARS, Fatehpur, and ARS, Navgaon exhibit the highest production levels, exceeding 2,000 quintals, which highlights their significant role in quality seed production. RARI, Durgapura, ARSS, Diggi, and ARSS, Kumher also contribute substantially, each surpassing 1,000 quintals of production. SKNCOA, Jobner and KVK, Ajmer demonstrate moderate production levels, while centers like ARSS, Ajmer and KVK, Dausa record the lowest contributions, indicating potential areas for improvement. Notably, KVK, Gonera, KVK, Fatehpur, and COA, Kumher maintain intermediate production levels, signifying consistent efforts in seed quality enhancement.

This distribution reflects the varying capacities and performance levels across centers, emphasizing the need to optimize resources and practices in underperforming locations while sustaining high output in leading centers. The data underscores the strategic importance of certain centers in achieving overall seed production goals for the University.




**Graph 4.3: Center-wise foundation, certified and TL Seed Production during 2021-22 to 2023-24**

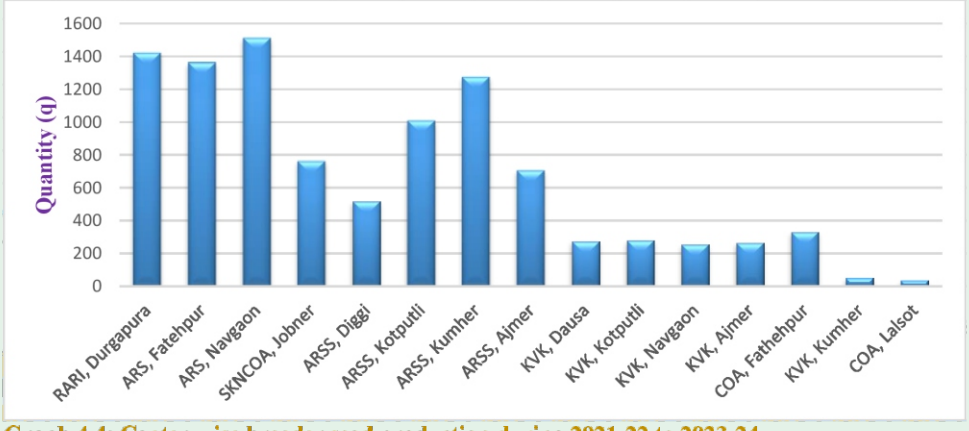
The graph 4.4 titled "Centre-wise breeder seed production (Kharif 2021-Rabi 2023-2024)" provides insights into the breeder seed production achievements of different centers under SKNAU over the mentioned period (Table 4.8). ARS, Navgaon emerges as the leading contributor with production exceeding 1,400 q, followed closely by ARS, Fatehpur and RARI, Durgapura, each surpassing 1,200 q. These centres play a pivotal role in breeder seed production, reflecting their advanced infrastructure and effective management.

**Table 4.8: Centre-quality seed production (FS/CS/TL) during 2021-22 to 2023-24**

| Name of Centre | 2021-22 | | 2022-23 | | 2023-24 | | Total |
|---|---|---|---|---|---|---|---|
| | *Rabi* | *Kharif* | *Rabi* | *Kharif* | *Rabi* | *Kharif* | |
| **RARI, Durgapura** | 457.4 | 15.2 | 548.9 | 0.0 | 353.0 | 0.0 | **1374.4** |
| **ARS, Fatehpur** | 482.6 | 101.5 | 218.5 | 53.28 | 1195.2 | 35.2 | **2086.2** |
| **ARS, Navgaon** | 390.4 | 130.0 | 417.8 | 0.0 | 558.0 | 3 | **1499.2** |
| **ARSS, Ajmer** | 48.2 | 0.0 | 67.6 | 3.52 | 94.0 | 2.5 | **215.8** |
| **ARSS, Diggi** | 577.1 | 0.0 | 581.3 | 0.2 | 235.6 | 4 | **1398.2** |
| **ARSS, Kotputli** | 152.2 | 7.6 | 366.6 | 0.0 | 80.9 | 0.0 | **607.4** |
| **ARSS, Kumher** | 382.4 | 0.0 | 373.0 | 0.0 | 221.5 | 0.0 | **976.9** |
| **KVK, Ajmer** | 22.0 | 15.7 | 19.0 | 0.0 | 0.0 | 0.0 | **56.7** |
| **KVK, Alwar** | 181.8 | 43.0 | 345.2 | 0.0 | 400.6 | 0.0 | **970.6** |
| **KVK, Dausa** | 14.8 | 0.0 | 31.6 | 0.0 | 69.7 | 0.0 | **116.0** |
| **KVK, Fatehpur** | 136.2 | 3.5 | 108.6 | 58.1 | 0.0 | 0.0 | **306.4** |
| **KVK, Gonera** | 69.9 | 0.4 | 334.6 | 0.0 | 260.4 | 0.0 | **665.3** |
| **KVK Kumher** | 0.0 | 1.2 | 159.4 | 0.0 | 145.2 | 0.0 | **305.7** |
| **KVK Dholpur** | 0.0 | 0.5 | 34.4 | 0.0 | 0.0 | 0.0 | **34.9** |
| **COA, Fatehpur** | 0.0 | 166.0 | 0.0 | 0.0 | 377.3 | 0.0 | **543.3** |
| **SKNCOA, Jobner** | 230.5 | 244.1 | 147.3 | 136.3 | 25.5 | 11 | **794.7** |
| **COA, Kumher** | 79.0 | 0.0 | 132.4 | 0.0 | 26.4 | 0.0 | **237.8** |
| **COA, Baseri** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.5 | **4.5** |

SKNCOA, Jobner and ARSS, Kumher demonstrate considerable contributions, with production levels between 800 and 1,000 q. In contrast, ARSS, Ajmer, ARSS, Diggi, and ARSS, Kotputli record moderate outputs, indicating the potential for further optimization of resources and practices. Centres like KVK, Dausa, KVK, Ajmer, and KVK, Fatehpur contribute minimally, producing less than 400 q each, suggesting a need for targeted interventions to enhance productivity.

COA, Lalsot records the lowest production, highlighting a critical area for improvement. The data underscores the importance of supporting underperforming centers while maintaining high productivity at leading centres to ensure a consistent supply of breeder seeds critical for sustainable agricultural development in the region.




**Graph 4.4: Center-wise breeder seed production during 2021-22 to 2023-24**

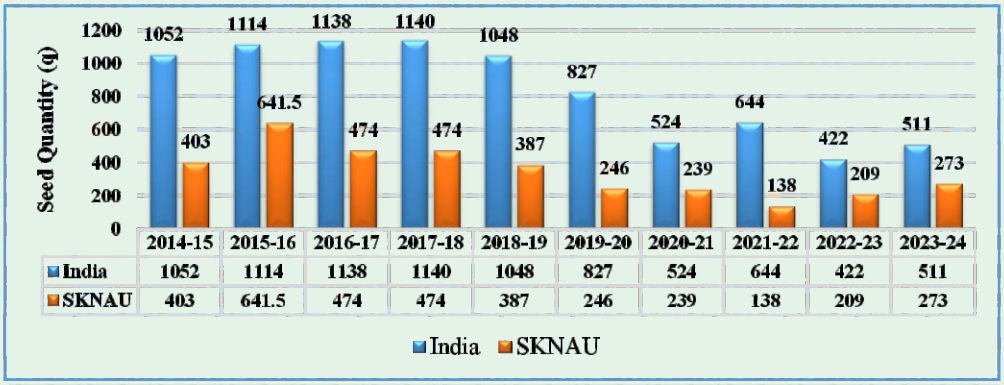
**Table 4.9: Centre-wise breeder seed production during 2021-22 to 2023-24**

| Name of Center | 2021-22 | | 2022-23 | | 2023-24 | | Total |
|---|---|---|---|---|---|---|---|
| | Rabi | Kharif | Rabi | Kharif | Rabi | Kharif | |
| ARS, Fatehpur | 349.3 | 49.61 | 362.7 | 114.5 | 337.6 | 150.5 | **1364.4** |
| ARS, Navgaon | 511.0 | 10.0 | 412.8 | 3.5 | 576.0 | 0.0 | **1513.3** |
| ARSS, Diggi | 154.2 | 1.6 | 182.0 | 11.7 | 165.2 | 2.83 | **517.6** |
| ARSS, Kotputli | 193.1 | 10.9 | 140.8 | 15.2 | 613.6 | 36.3 | **1010.0** |
| ARSS, Kumher | 183.3 | 0.0 | 360.8 | 1.4 | 723.6 | 7.0 | **1276.1** |
| ARSS, Ajmer | 225.1 | 14.2 | 247.5 | 21.2 | 197.1 | 0.9 | **706.1** |
| SKNCOA, Jobner | 122.9 | 64.8 | 86.9 | 72.7 | 219.3 | 196.2 | **762.8** |
| KVK, Dausa | 100.3 | 0.0 | 104.0 | 0.0 | 70.45 | 0.0 | **274.7** |
| KVK, Kotputli | 45.3 | 15.9 | 0.0 | 18.5 | 181.7 | 19 | **280.5** |
| KVK, Navgaon | 130.0 | 0.0 | 39.4 | 0.0 | 87.0 | 0.0 | **256.4** |
| KVK, Ajmer | 72.0 | | 108.0 | 0.0 | 85.5 | 0.0 | **265.5** |
| RARI, Durgapura | 249.6 | 220.5 | 206.3 | 271.4 | 412.7 | 61.8 | **1422.4** |
| COA, Fathehpur | 0.0 | 0.0 | 0.0 | 0.0 | 276.3 | 55.7 | **332.1** |
| KVK, Kumher | 0.0 | 0.0 | 0.0 | 0.0 | 51.4 | 0.0 | **51.4** |
| COA, Kumher | 0.0 | 3.9 | 0.0 | 0.0 | 0.0 | 10.8 | **14.7** |
| COA, Lalsot | 0.0 | 29.3 | 0.0 | 4.97 | 0.0 | 3.7 | **38.0** |
| KVK, Fathehpur | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | **0.5** |
| COA, Kishangarh Bas | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | **2.0** |

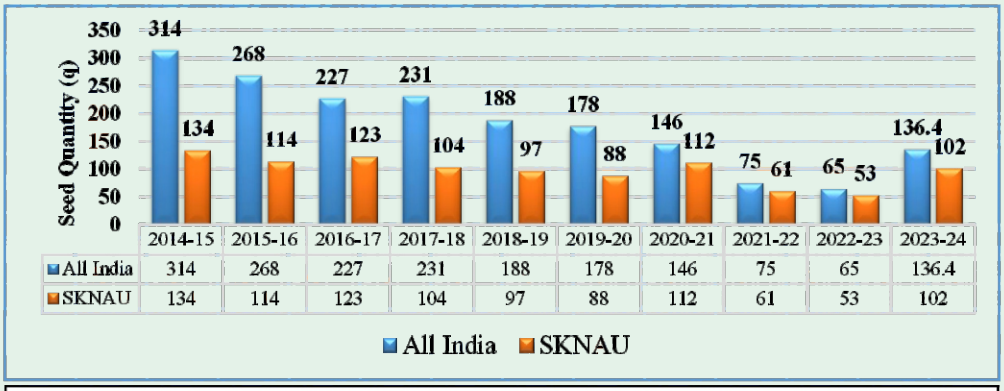
## 4.4 Impact of SKNAU, Jobner Varieties:

SKNAU is well known for production of wheat, barley and clusterbean breeder seed programme. We immensely contributing to the national sizeable portion of breeder seed programme during 2013-14 to 2023-24. At the national level, our University contributes 11% of India's total breeder seed production for wheat varieties, 44% for barley varieties, and an impressive 54% for cluster bean varieties in previous ten years (Graph 4.5 to 4.7). These contributions highlight our pivotal role in supporting the country's agricultural development and seed production programs.


**Graph 4.5: SKNAU's Wheat Varieties BS contribution during 2014-15 to 2023-24**




**Graph 4.6: SKNAU's Barley Varieties BS contribution during 2014-15 to 2023-24**




**Graph 4.7: SKNAU's Clusterbean Varieties BS contribution during 2014-15 to 2023-24**

**4.5 Seed Production Programme Rabi 2024-25:** Table 4.10 outlines the planned breeder seed production program for the *Rabi* 2025-26 season, covering various crops such as wheat, barley, gram, lentil, field pea, fenugreek, coriander, fennel, cumin, and taramira. For each crop, different varieties are listed along with their respective production quantities in quintals, categorized into allocations through the Department of Agriculture and Cooperation (DAC), Memorandum of Understanding (MoU), and private entities (Pvt). Wheat has the most extensive production plan, with several varieties like Raj 1482 and Raj 4037 contributing to a total planned production of 3075.3 quintals over 121.5 hectares, aiming for a target of 3695.0 quintals. Barley follows with a planned production of 679.5 quintals across 30.45 hectares and a target of 858.0 quintals. Gram, lentil, and field pea have more modest targets, with gram aiming for 105.0 quintals over 9.5 hectares and lentil targeting 75 quintals. Spices such as fenugreek, coriander, fennel, and cumin have smaller production plans, collectively targeting 38.5 quintals over 4.0 hectares. Taramira, a minor crop, has a total production target of 3.75 quintals over 0.75 hectares. Overall, the program aims to produce 3963.4 quintals across various crops, covering a total area of 174.7 hectares, with a cumulative production target of 4815.25 quintals. This structured approach ensures a well-organized seed production effort for the upcoming *Rabi* season.

## Table 4.10: Breeder seed production programme of Rabi, 2024-25 at SKNAU

| Crop | Variety | Indent (q), 2025-26 | | | | BS Production program | |
|---|---|---|---|---|---|---|---|
| | | DAC | MoU | Pvt | Total | Area (ha) | Target(q) |
| Wheat | Raj 1482 (1983) | 32.2 | 140.0 | 200.0 | 372.2 | 19.0 | 540.0 |
| | Raj 3077 (1989) | 63.2 | 120.0 | 130.0 | 313.2 | 12.0 | 360.0 |
| | Raj 3765 (1996) | 46.0 | 60.0 | 80.0 | 186.0 | 7.0 | 210.0 |
| | Raj 4037 (2004) | 359.4 | 400.0 | 800.0 | 1559.4 | 62.0 | 1875.0 |
| | Raj 4079 (2011) | 16.5 | 10.0 | 100.0 | 126.5 | 6.0 | 180 |
| | Raj 4120 (2009) | 0.0 | 10.0 | 90.0 | 100.0 | 4.0 | 110.0 |
| | Raj 4238 (2016) | 318.0 | - | 100.0 | 418.0 | 14.0 | 420.0 |
| | **SubTotal** | **835.3** | **740.0** | **1500.0** | **3075.3** | **124** | **3695.0** |
| Barley | RD 2035 (1994) | 47.3 | 56.9 | 90.0 | 194.2 | 7.0 | 210.0 |
| | RD 2052 (1991) | 1.2 | 20.1 | 30.0 | 51.3 | 2.0 | 60.0 |
| | RD 2552 (2000) | 0.0 | - | 10.0 | 10.0 | 0.25 | 8.0 |
| | RD 2715 (2009) | 7.0 | - | 13.0 | 20.0 | 1.0 | 30.0 |
| | RD 2786 (2013) | 3.0 | - | 27.0 | 30.0 | 1.2 | 30.0 |
| | RD 2794 (2016) | 11.0 | - | 20.0 | 31.0 | 1.0 | 30.0 |
| | RD 2849 (2016) | 2.0 | - | 28.0 | 30.0 | 5.0 | 150.0 |
| | RD 2899 (2018) | 116.0 | - | 50.0 | 166.0 | 6.0 | 175.0 |
| | RD 2907 (2018) | 117.0 | - | 30.0 | 147.0 | 7.0 | 165.0 |
| | **SubTotal** | **304.5** | **77.0** | **298.0** | **679.5** | **30.45** | **858.0** |
| Gram | CSJ 515 (2016) | 1.0 | 50.0 | 25.0 | 76.0 | 8.0 | 80.0 |
| | RSG 807 (2007) | 13.0 | - | 1.0 | 14.0 | 1.5 | 15.0 |
| | CSJK 174 (2021) | 4.0 | - | 2.5 | 6.5 | 1.0 | 10.0 |
| | **SubTotal** | **18.0** | **50.0** | **28.5** | **96.5** | **10.5** | **105.0** |
| Lentil | KM 3 (2022) | - | 60.0 | - | 60.0 | 4.0 | 60.0 |
| | KM 2 | - | - | - | 15.0 | 1.0 | 15.0 |
| F. Pea | RFP 4 | | 15.0 | - | 15.0 | 2.0 | 20.0 |
| | **SubTotal** | - | **75.0** | - | **90.0** | **8.5** | **95.0** |
| Fenugreek | RMt 1 (1990) | 0.50 | - | - | 0.50 | 0.50 | 5.0 |
| | RMt 305 (2007) | 0.50 | - | - | 0.50 | 0.50 | 5.0 |
| | RMt 354 (2022) | 0.20 | - | - | 0.20 | 0.50 | 5.0 |
| Coriander | RCr 435 (2004) | 0.55 | - | - | 0.55 | 0.5 | 5.0 |
| | RCr 436 (2002) | 0.65 | - | - | 0.65 | 0.5 | 5.0 |
| | RCr 728 (2010) | 0.65 | - | - | 0.65 | 0.5 | 5.0 |
| Fennel | RF 205 (2012) | 0.55 | - | - | 0.55 | 0.25 | 2.5 |
| | RF 289 (2024) | - | - | - | 0.50 | 0.25 | 2.5 |
| | RF 290 (2024) | - | - | - | 0.50 | 0.25 | 2.5 |
| Cumin | RZ 223 (2007) | - | - | - | 0.50 | 0.25 | 1.0 |
| | **SubTotal** | **3.6** | **0.0** | **0.0** | **5.1** | **4.0** | **38.5** |
| Taramira | RTM 1351 (2017) | - | - | 0.1 | 1.0 | 0.25 | 1.25 |
| | RTM 1355 (2018) | - | - | - | 0.50 | 0.25 | 1.25 |
| | RTM 1624 (2022) | - | - | - | 0.50 | 0.25 | 1.25 |
| | **SubTotal** | - | - | **0.1** | **2.0** | **0.75** | **3.75** |
| | **Total** | **1161.4** | **942.0** | **1826.6** | **3948.4** | **176.7** | **4795.25** |

## 5. Quality Seed Production under EBSP and Seed Hub on Pulses

### 5.1 Seed production activities under Enhancing Breeder Seed Production (EBSP) of millets under NFSM-Nutri-cereals

**Table 5.1: Nucleus seed produced (kg) pearl millet hybrid variety parental lines (manual) during 2018-19 to 2022-24**

| Hybrids | Parental Line | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|---|---|---|---|---|---|---|
| RHB-233 | ICMA 99444 | - | - | 2.4 | 6.4 | 2.4 |
| | ICMB 99444 | - | - | 1.5 | 4.4 | 1.5 |
| | RIB 15176 | - | - | 3.9 | 4.9 | 3.9 |
| RHB-234 | ICMA 02333 | - | - | 2.2 | 5.2 | 2.2 |
| | ICMB 02333 | - | - | 2.5 | 3.5 | 2.5 |
| | RIB-15177 | - | - | 4.0 | 4.0 | 4.0 |
| RHB-223 | ICMA 96666 | 1.6 | 2.0 | 1.6 | 4.6 | 1.6 |
| | ICMB 96666 | 1.3 | 1.5 | 1.2 | 2.5 | 1.2 |
| | RIB-3135-18 | 3.7 | 2.5 | 4.7 | 6.7 | 4.7 |
| RHB-173 | ICMA 93333 | 1.2 | 1.3 | 1.6 | 2.6 | 1.6 |
| | ICMB 93333 | 0.5 | 0.3 | 1 | 0.5 | 0.4 |
| | RIB-192 | 2.5 | 3.6 | 2.4 | 2.4 | 2.4 |
| RHB-177 | ICMA 843-22 | 1.5 | 2.5 | 0.5 | 1.5 | 0.5 |
| | ICMB 843-22 | 1.0 | 1.2 | 0.3 | 0.8 | 0.4 |
| | RIB-494 | 2.8 | 3.0 | 3.8 | 6.8 | 3.8 |
| | **Total** | **16.1** | **17.9** | **33.6** | **56.8** | **33.1** |

**Table 5.2: Breeder seed indent and production of pearl millet hybrids/varieties during 2018-19 to 2023-24**

| Hybrids/ Variety | Parental Lines | 2018-19 | | 2019-20 | | 2020-21 | | 2021-22 | | 2022-23 | | 2023-24 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Indent (kg) | Production (kg) | Indent (kg) | Production (kg) | Indent (kg) | Production (kg) | Indent (kg) | Production (kg) | Indent (kg) | Production (kg) | Indent (kg) | Production (kg) |
| **Raj 171** | - | 10.0 | 760.00 | - | 10.0 | - | - | - | - | - | - | - | - |
| **RHB-233** | ICMA 99444 | - | - | - | - | - | - | - | 165.00 | - | - | - | - |
| | ICMB 99444 | - | - | - | - | - | - | - | - | - | - | 1.0 | 2.0 |
| | RIB 15176 | - | - | - | - | 1.0 | 5.0 | - | 82.0 | 1.0 | 10.0 | 7.0 | 200.0 |
| **RHB-234** | ICMA 02333 | - | - | - | - | - | - | - | 550.0 | - | - | - | 150.0 |
| | ICMB 02333 | - | - | - | - | - | - | - | - | - | - | - | - |
| | RIB-15177 | - | - | - | - | 1.0 | 2.0 | 3.0 | 36.0 | 4.0 | 70.0 | 12.0 | 200.0 |
| **RHB-223** | ICMA 96666 | - | - | - | - | - | - | - | - | - | - | 9.0 | 95.0 |
| | ICMB 96666 | - | - | - | - | - | - | - | - | - | - | - | |
| | RIB-3135-18 | 10.0 | 60.0 | - | - | 4.0 | 250.0 | - | - | 7.0 | 20.0 | 7.0 | 170.0 |
| **RHB-173** | ICMA 93333 | - | - | - | - | - | 350.0 | - | - | - | - | - | - |
| | RIB-192 S/99 | 5.0 | 13.0 | 5.0 | 55.00 | - | 204.0 | - | - | - | - | - | - |
| **RHB-177** | ICMA 843-22 | - | - | - | - | - | - | - | - | - | - | - | - |
| | RIB-494 | 7.0 | 23.0 | 5.0 | 10.0 | - | 75.0 | - | - | - | - | - | - |
| | **Total** | **32.0** | **856.0** | **20.0** | **65.0** | **6.0** | **886.0** | **3.0** | **833.0** | **12.0** | **100.0** | **30.0** | **797.0** |

**Table 5.3: Breeder seed (kg) of different parental lines of pearl millet hybrids supplied to RSSC during 2018-19 to 2023-24**

| S.No. | Parental Lines | 2018-19 | 2019-20 | 2020 -21 | 2021-22 | 2022 -23 |
|---|---|---|---|---|---|---|
| 1. | RIB 494 (Pollinator of RHB 177) | - | 5 | 5 | - | - |
| 2. | RIB 192 (Pollinator of RHB 173) | - | 5 | 5 | - | - |
| 3. | RIB-3135-18 (Pollinator of RHB 223) | 60 | 7 | 5 | 280 | - |
| 4. | RIB-15176 (Pollinator of RHB 233) | - | - | - | 82 | - |
| 5. | RIB-15177 (Pollinator of RHB 234) | - | - | - | 36 | 50 |
| 6. | ICMA-9944 (Female of RHB 233) | - | - | - | 164 | - |
| 7. | ICMA-02333 (Female of RHB 234) | - | - | - | 275 | 200 |
| | **Total** | **60.0** | **17.0** | **15.0** | **837.0** | **250.0** |

**Table 5.4: Certified seed of pearl millet hybrids produced by different agencies and expected area covered by hybrid varieties during 2018-19 to 2022-23**

| Year | Hybrids | Agency/Institute | Certified Seed Produced(q) | Area covered (ha) | Total Area Covered (ha) |
|---|---|---|---|---|---|
| **2018** | RHB 177 | RSSC & Rajfed | 2000+1000 | 75000 | **100000** |
| | RHB 173 | RSSC | 1000 | 25000 | |
| **2019** | RHB 177 | RSSC | 2000 | 50000 | **112500** |
| | RHB 173 | RSSC | 2500 | 62500 | |
| **2020** | RHB 177 | NSC | 630 | 15750 | **53475** |
| | RHB 173 | NSC | 1509 | 37725 | |
| **2021** | RHB-223 | RSSC & NSC | 600+1500 | 52500 | **52500** |
| **2022** | RHB-223 | RSSC | 2000 | 50000 | **112500** |
| | RHB-233 | RSSC | 2000 | 50000 | |
| | RHB-234 | RSSC | 500 | 12500 | |
| **2023** | RHB 223 | RSSC | 4500 | 112500 | **212500** |
| | RHB 233 | RSSC | 3000 | 75000 | |
| | RHB 234 | RSSC | 1000 | 25000 | |
| | | **Total** | **25739** | **643475** | **643475** |

## 5.2 Seed production activities under Enhancing Breeder Seed Production for Increasing Indigenous Production of Pulses in India

**Table 5.5: The targeted varieties of different pulse crops of which breeder seed produced under EBSP during 2016-17 to 2023-24 at SKNAU, Jobner**

| Crop | Targeted Varieties and Year of Release |
|---|---|
| **Mungbean** | IPM 2-14 (2011), IPM 02-3(2009), MH 421 (2014), RMG 492(2003), RMG 975 (2016), MSJ 118(2016), Virat (2016), Shikha(2016) |
| **Urdbean** | IPU 94-1(2001), IPU 2-43 (2009), Pratap Urd 1 (2012), MU 2(2018), KU 3 (2020), KU 4 (2020) |
| **Chickpea** | CSJ 515 (2016), RSG 974 (2011), RSG 902 (2007), RSG 963 (2005), RSG 973 (2006), RSG 945 (2005), RSG 895 (2005), CSJK 6 (Kabuli) (2012), GNG 2171 (2017) |
| **Fieldpea** | HFP 529 (2012), HFP 9907 B (2007), RFP 4 (2016) |
| **Lentil** | IPL 406 (2007), IPL 316 (2013), RLG 5 (2016), Kota Masoor 1 (2018), Kota Masoor 2 (2019), Kota Masoor 3 (2021) |

**Table 5.6: Breeder seed production (qt) under EBSP on pulses during 2016-17 to 2023-24 at SKNAU, Jobner**

| Crop | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Kh 2024 |
|---|---|---|---|---|---|---|---|---|---|
| **Mungbean** | 32.1 | 31.1 | 26.2 | 9.5 | 42.0 | 23.5 | 23.5 | 26.9 | 60.0 |
| **Urdbean** | 53.0 | 32.0 | 20.0 | 8.5 | 14.0 | 14.1 | 14.1 | 23.0 | 21.0 |
| **Chickpea** | 138.6 | 270.0 | 46.0 | 42.0 | 28.0 | 68.0 | 15.0 | 58.0 | 0.0 |
| **Fieldpea** | 9.3 | 12.0 | 11.0 | 19.0 | 20.0 | 0.0 | 0.0 | 23.6 | 0.0 |
| **Lentil** | 5.2 | 20.0 | 30.0 | 66.0 | 16.1 | 0.0 | 74.7 | 123.5 | 0.0 |
| **Total** | **238.3** | **365.1** | **133.2** | **145.1** | **120.1** | **105.7** | **127.4** | **255.1** | **81.0** |

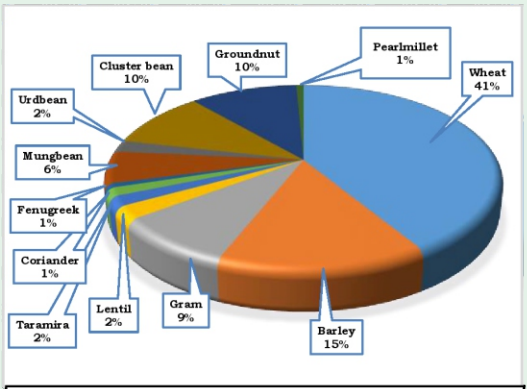
## 5.3 Quality seed production under seed hubs on pulses

**Table 5.7: Quality seed production (CS & FS) at different units of SKNAU under Seed Hub on Pulses**

| Year | Crop | Varieties | Achievement (q) |
|---|---|---|---|
| **A. KVK, Navgaon** | | | |
| 2017-18 | Mungbean , Field Pea & Chickpea | IPM-02-14, Samrat, HFP 529 & CSJ 515 | 1032 |
| 2018-19 | Mungbean & Chickpea | IPM-02-14 & CSJ 515 | 1017 |
| 2019-20 | Mungbean & Chickpea | IPM-02-14 & CSJ 515 | 975 |
| 2020-21 | Mungbean & Chickpea | IPM 02-14, Shikha, Virat, CSJ 515 & GNG-2144 | 1025 |
| 2021-22 | Mungbean & Chickpea | Shikha (IPM-410-03) & GNG-2144 | 1007 |
| 2022-23 | Mungbean & Chickpea | MH-1142 & GNG-2144 | 1012 |
| 2023-24 | Mungbean & Chickpea | MH-1142 & GNG-2144 | 1022 |
| 2024-25 | Mungbean | MH 1142 | 302 |
| | | **Sub- total** | **7392** |
| **B. KVK, Tabiji** | | | |
| 2019-20 | Mungbean & Chickpea | MH 421, GNG 2144 & GNG 1958 | 636 |
| 2020-21 | Mungbean & Chickpea | MH 421, GNG 2144 & GNG 1958 | 756 |
| 2021-22 | Mungbean & Chickpea | Shikha & GNG 2171 | 857 |
| 2022-23 | Mungbean & Chickpea | MH 1142 & GNG 2144 | 590 |
| 2023-24 | Mungbean & Chickpea | MH 1142 & HC 7 | 677 |
| 2024(Kh) | Mungbean | MH 1142 | 217 |
| | | **Sub-total** | **3733** |
| **C. RARI, Durgapura** | | | |
| 2019-20 | Chickpea | CSJ 515 & GNG 1958 | 225 |
| 2020-21 | Chickpea | CSJ 515 | 99 |
| 2021-22 | Chickpea | CSJ 515 & GNG 2171 | 343 |
| 2022-23 | Chickpea | GNG 2144 | 18 |
| 2023-24 | Mungbean | MH 1142 | 32 |
| 2024 (kh) | Mungbean and urdbean | MH 1142, KU 3 & KU 4 | 38 |
| | | **Sub -total** | **755** |
| | | **Total** | **11880** |

## 6. Revenue Generation through Breeder Seed Production

The pie chart 6.1 illustrates the revenue generated by different crops breeder seed from 2017 onwards. Wheat stands out as the most significant contributor, accounting for 41% of the total revenue. Barley follows with 15%, and groundnut and cluster bean each contribute 10%. Gram (9%) and mungbean (6%) also make notable contributions to the revenue. Other crops, including taramira and lentil, each represent 2%, while fenugreek and coriander contribute 1% each.




**Pie Chart 6.1**: Crop-wise revenue generated from BS during 2017-18 to 2023-24

The dominance of wheat suggests its critical role in the overall University revenue, possibly due to its widespread cultivation and market demand. Barley's significant share also highlights its importance, likely due to its utility in food and industrial applications. Groundnut and cluster bean demonstrate their value as cash crops, whereas the lower contributions of crops like fenugreek and coriander might indicate limited cultivation or niche market demand. This distribution emphasizes the need for diversification in crop production to balance revenue generation and ensure resilience in the agricultural sector.

The graph 6.1 presents the year-wise revenue generated by breeder seed (in lakhs) from 2017-18 to 2023-24. The revenue shows a fluctuating trend over the years, with a significant increase in the final year. Starting at ₹256.88 lakh in 2017-18, revenue peaked at ₹313.01 lakh in 2018-19 before declining to ₹294.05 lakh in 2019-20 and further to ₹265.42 lakh in 2020-21. A slight recovery occurred in the subsequent years, reaching ₹272.73 lakh in 2021-22 and ₹280.50 lakh in 2022-23. However, a substantial rise was observed in 2023-24, where revenue jumped to ₹456.05 lakh, marking the highest value in the period analysed (Table 6.1). The sharp increase in 2023-24 suggests a notable improvement, possibly due to better market conditions, enhanced production efficiency, or diversification in revenue streams.


**Graph 6.1: Year-wise revenue generation by breeder seed production during 2017-18 to 2023-24**

**Table 6.1 : Field crops and year-wise revenue (Rs.) generated by breeder seed at SKNAU, Jobner**

| Crop | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Total (Rs.) |
|---|---|---|---|---|---|---|---|---|
| **Wheat** | 7559645 | 12972000 | 10570065 | 11437991 | 13785077 | 12854477 | 19543305 | 88722558 |
| **Barley** | 5459004 | 6096872 | 4684716 | 3172164 | 2327120 | 2991892 | 6769320 | 31501088 |
| **Gram** | 4239040 | 4032210 | 4906200 | 3288350 | 884520 | 235300 | 1117740 | 18703360 |
| **Field pea** | 4550 | 94276 | 78806 | 0 | 22750 | 0 | 214851 | 415233 |
| **Lentil** | 32802 | 657734 | 1017170 | 107800 | 0 | 1151150 | 1908830 | 4875486 |
| **Taramira** | 44450 | 10160 | 75057 | 100457 | 50800 | 66675 | 28575 | 376174 |
| **Mustard** | 5420 | 8130 | 0 | 0 | 0 | 0 | 1036440 | 1049989.5 |
| **Coriander** | 240000 | 1209600 | 1032400 | 176000 | 0 | 0 | 407600 | 3065600 |
| **Fenugreek** | 916500 | 0 | 83750 | 210250 | 0 | 0 | 342500 | 1553000 |
| **Fennel** | 70000 | 0 | 0 | 0 | 0 | 0 | 4000 | 74000 |
| **Mungbean** | 1849823 | 1266433 | 1717936 | 2857930 | 1723157 | 1153841 | 1566300 | 12135420 |
| **Urdbean** | 494000 | 0 | 209950 | 321100 | 348270 | 569335 | 2470000 | 4412655 |
| **Cowpea** | 63240 | 93296 | 156128 | 108120 | 168368 | 86088 | 326400 | 1001640 |
| **Cluster bean** | 3047475 | 3654473 | 2295424 | 2553750 | 2341959 | 3681032 | 4086000 | 21660113 |
| **Groundnut** | 1647300 | 1183200 | 2135710 | 2011100 | 5594360 | 5111900 | 5100000 | 22783570 |
| **Pearlmillet** | 15680 | 23520 | 442176 | 197960 | 27440 | 148960 | 684040 | 1539776 |
| **Total** | 25688929 | 31301904 | 29405488 | 26542972 | 27273821 | 28050650 | 45605901 | 21,38,69663 |


## 7. Field crop varieties developed by SKNAU, Jobner

### A. Wheat *(Triticum Aestivum L.)*


Raj 1482 (1983)


Raj 1555 (1983)

Raj 3077 (1989)

Raj 3765 (1996)

Raj 3777 (2006)

Raj 4037 (2004)


Raj 4079 (2011)

Raj 4083 (2007)


Raj 4120 (2009)

Raj 4238 (2016)

Raj 6560 (2005)

Raj Molya Rodhak 1 (2011)

## B. Barley *(Hordeum Vulgare)*

| | | |
|---|---|---|
|  |  |  |
| RD 2052 (1991) | RD 2035 (1994) | RD 2503 (1997) |
|  |  |  |
| RD 2508 (1997) | RD 2552 (2000) | RD 2592 (2004) |
|  |  |   |
| RD 2624 (2004) | RD 2660 (2006) | RD 2668 (2007) |
|  |  |  |
| RD 2715 (2009) | RD 2786 (2013) | RD 2794 (2016) |
|  |  |  |
| RD 2849 (2016) | RD 2899 (2018) | RD 2907 (2018) |

## C. Chickpea *(Cicer Arietinum L.)*


RSG 888 (2003)

CSD 884 (2003)


RSG 963 (2005)

RSG 931 (2006)


RSG 973 (2006)


RSG 896 (2007)

RSG 902 (2007)


RSG 991 (2007)


RSG 974 (2012)


CSJK 21 (2013)


CSJ 515 (2016)

CSJK 174 (2021)

## D. Indian Mustard *(Brassica Juncea)*


Aravali (2001)


Navgold (2006)


RRN 505 (2006)


RRN 573 (2013)

## E. Taramira *(Eruca vesicaria* ssp. *sativa)*

RTM 314 (2001)

RTM 2002 (2007)

RTM 1355 (2014)

RTM 1351 (2015)

RTM 1624 (2021)

## F. Pearl millet *(Pennisetum Glaucum)*


RCB 2 (1985)

Raj 171 (1992)


RHB 154 (2009)


RHB 173 (2011)

RHB 177 (2011)


RHB 223 (2018)


RHB 233 (2019)


RHB 234 (2019)

RHB 228 (2021)

## G. Cowpea *(Vigna Unguiculata)*

RC 19 (1987)

RC 101 (2001)

CPD 119 (2018)

## H. Cluster Bean (Cyamopsis Tetragonoloba)


RGC 197 (1990)

RGC 936 (1994)


RGC 1002 (1999)


M 83 (2000)

RGC 1033 (2002)


RGC 1031 (2005)

RGC 1033 (2011)

RGC 1038 (2006)

RGC 1055 (2007)


RGC 1066 (2008)


RGr 12-1 (2018)

RGr 18-1 (2021)

## I. Other Rabi Pulses

Fieldpea: RFP 4 (2016)

Lentil: RLG 5 (2016)

Rajmash: RSJ 178 (2006)

## J. Groundnut (Arachis Hypogaea)


RG 382 (2005)


RG 425 (2011)


RG 510 (2012)

RG 578 (2015)


RG 559-3 (2016)


RG 638 (2023)

## K. Mungbean (Vigna Radiata)


RMG 62 (1991)

RMG 268 (1999)

RMG 344 (2001)


RMG 492 (2003)

RMG 975 (2016)

MSJ 118 (2016)

## L. Seed Spices

### Coriander *(Coriandrum Sativum)*


RCr 435 (2006)

RCr 436 (2002)


RCr 728 (2010)

### Cumin *(Cuminum Cyminum L.)*


RZ 19 (1988)

RZ 209 (1995)


RZ 223 (2007)

### Fenugreek *(Trigonella Foenum-Graecum)*

RMt 1 (1989)


RMt 305 (2007)


RMt 354 (2022)

### Fennel *(Foeniculum Vulgare)*


RF 101 (2002)


RF 125 (2004)

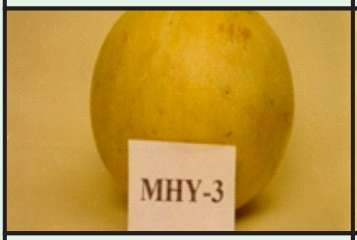

RF 143 (2007)


RF 205 (2010)

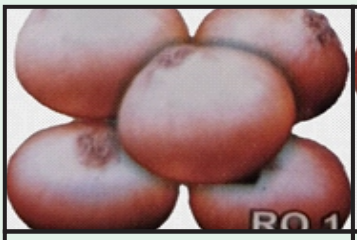

RF 289 (2024)


RF 290 (2024)

## M. Melon *(Cucumis Melo)*

| | | |
|---|---|---|
|   |   |   |
| **Durgapura Madhu (1971)** | **RM 43 (1997)** | **RM 50 (2004)** |
|   |   |  |
| **MHY 3 (1999)** | **MHY 5 (2004)** | **Durgapura Lal (2004)** |

## N. Onion (*Allium cepa*)

| | | |
|---|---|---|
|   |   |   |
| **RO 1 (2004)** | **RO 59 (2005)** | **RO 252 (2011)** |

## 8. Untapped Potential

The jurisdiction of SKNAU, Jobner agroecology, encompassing semi-arid and flood-prone environments, provides an ideal condition for seed production of cereals, pulses, millets and vegetables. More than 800 ha of cultivable land are available for seed production under different university units, including research stations, research sub-stations, colleges and KVK. However, this potential remains slightly untapped due to limitations of irrigation water, inadequate infrastructure for improved storage, grading plants, human resources and demand of University seed etc.

The University has established Memoranda of Understanding (MoUs) with private seed producers to tackle agricultural challenges and seize new opportunities. These agreements aim to develop detailed seed roadmaps to improve seed quality and availability, while fostering a supportive environment for private sector involvement. Additionally, collaboration with private companies facilitates technology transfer and revenue generation, leading to the development of resilient seed varieties and financial benefits for both the university and its partners. Recently, the University signed a Memorandum of Understanding (MoU) with three seed-producing associations to promote and distribute quality seeds of improved varieties developed by the university on a national level, while also generating revenue. This initiative is still in its initial stages and requires further expansion.

In addition, the University is working to establish the necessary infrastructure for optimal seed production conditions at its new constituent units. We plan to implement seed production programs at new colleges, including COA Peethampuri, COA Lalsot, COA Kumher, COA Fathepur, COA Navgaon, COA Kisangarh Bas, COA Kotputli, COA Bhusawar, COA Jhilai and COA Basedi. These colleges have around 172 hectare land for seed production programme and adding more than 4000 quintals of quality seed annually to total university seed production. The above said quantity of quality seed will help to achieve the target of 20,000 quintlaes of quality seed produced by university in coming years.

## Table 8.1 : The details of available land for seed production at new constituent colleges

| Name of the college | Available land for seed production (ha) |
|---|---|
| College of Agriculture, Lalsot | 35.00 |
| College of Agriculture, Kumher | 22.00 |
| College of Agriculture, Fatehpur | 20.00 |
| College of Agriculture, Navgaon, Alwar | 30.00 |
| College of Agriculture, Basedi, Dholpur | 15.00 |
| College of Agriculture, Kotputli | 10.00 |
| College of Agriculture, Kishangarh Bas, Alwar | 10.00 |
| College of Agriculture, Bhusawer-Bharatpur | 10.00 |
| College of Agriculture, Jhilai (Niwai),Tonk | 10.00 |
| College of Agriculture, Peethampuri, Sikar | 10.00 |
| Total | 172.00 |

Farmer participatory breeder seed production plays a crucial role in the contract farming system, particularly in agricultural development programs. In this model, the university collaborates with local farmers to implement seed production initiatives directly on their fields, which are equipped with reliable and assured irrigation facilities. This collaboration not only helps increase the total volume of seed produced by the university but also facilitates the promotion and adoption of university-developed crop varieties among local farmers, thereby enhancing biodiversity and improving agricultural resilience in the region.

Recently, the University was sanctioned a seed hub project for groundnut production from the Indian Council of Agricultural Research (ICAR). This initiative has set an ambitious target of producing over 1,000 quintals of breeder seed each year. The scale of production required is significant, and accomplishing such a volume solely on the university farms is not achievable due to limited land and resources. Consequently, engaging in contract farming becomes essential as it allows the university to meet its production goals and supports farmers by providing them with the necessary knowledge, resources, and access to quality seeds. This partnership not only benefits the university in fulfilling its seed production targets but also empowers farmers by improving their livelihoods and fostering agricultural innovation in their communities.

## Table 8.2 : SKNAU signed MoU with private seed companies and private seed producing societies/groups

| S.No. | Name of company/agencies |
|---|---|
| 1. | Hadoti Seed Producer Association, Kota |
| 2. | Kosco Hybrid and Research Private Limited |
| 3. | Rajasthan State Certified Seed Producers Association, Sri Ganganagar |
| 4. | Kaveri Seeds Pvt Ltd. |
| 5. | One Fife Foundation, NGO |
| 6. | Super Seeds Private Limited, Hisar |
| 7. | Barmalt Malting India Pvt Ltd |

Fig. 8.1 : MoU signed with Kosco Hybrid and Research Private Limited

Fig. 8.2 : MoU signed with Hadoti Seed Producer Association

Fig. 8.3 : MoU signed with Barmalt Malting India Pvt Ltd

## Glimpses

Fig 9.1 : Inauguration of Seed Processing Unit (Seed Hub Project) on 21 July 2023 by Hon'ble VC Prof. Balraj Singh


Fig 9.2 : Breeder seed production at ARSS, Ajmer

Fig 9.3 : Breeder seed production at KVK, Dausa


Fig 9.4 : Breeder seed production at ARS, Navgaon

Fig 9.5 : Nucleus and breeber Seed Production of Barley at RARI, Durgapura

## Historical / Glorious Achievements

- First Triple dwarf wheat in India : Lal Bahadur (1971)
- First salinity tolerant wheat in India : Kharachia 65 (1974)
- A wonder wheat (Suitable for timely, late & saline conditions) : Raj 3077 (1989)
- India's first heat tolerant wheat : Raj 3765 (1996)
- India's first CCN resistant wheat : Raj Molya Rodhak 1 (2011)
- India's first Ug 99 (stem rust race) resistant wheat : Raj 4120 (2009)
- First dwarf barley mutant in world: RDB-1 (1974)
- First salinity tolerant barley in India: Bilara-2 (1980)
- First nematode resistant barley in India: Rajkiran (1982)
- India's first dual purpose barley: RD-2715 (2009)
- Barley variety with highest yield potential in India : RD 2035 (1994)
- A unique barley: RD-2552 (2000)
  (Suitable for irrigated/rainfed/saline-alkaline conditions & green fodder purpose)
- Rajsthan's first two rowed malt barley: RD-2668 (2007)
- Malt barley with excellent malting / brewing quality: RD-2849 (2016)
- Drought tolerant hybrid of pearl millet: RHB 177 (2011)
- Biofortified hybrid of pearl millet: RHB 233 & RHB 234 (2019)
- Early maturing cluster bean variety : RGC 936 (1994)
- First white seeded cowpea variety: RC 101 (1987)
- First rainfed double podded chickpea variety: RSG 888 (2003)
- First kabuli chickpea variety in the state: RSGK 6 (2003)
- First double podded variety of chickpea: CSJD 884 (2003)
- First late sown chickpea variety : RSG 963 (2005)
- First white flowerd variety of chickpea: RSG 895 (2005)
- First rainfed as well as irrigated chickpea variety: RSG 931 (2006)
- Salinity tolerant variety of chickpea; RSG 896 (2007)
- First green seeded variety of chickpea: RSG 991 (2007)
- Extra large seeded Kabuli chickpea: CSJK 21 (2013)
- Green fleshed, sweet with pleasant fragrance muskmelon variety:
  Durgapura Madhu (1997)
- Water melon variety: Durgapura Lal (2004)
- First copper-red, mild pungent onion variety of the state: RO 1 (2004)

## Milestone Varieties of Wheat Developed by SKNAU

| Raj 3077 | Raj 3765 | Raj 4037 | Raj 4120 | Raj MR 1 | Raj 4238 |
|---|---|---|---|---|---|
| 1989 | 1996 | 2004 | 2009 | 2011 | 2016 |
| Wonder Wheat: Suitable for Saline/Alkalne, Timely Sown and Late Sown | Heat Tolerant Wheat and Suitable for Late Sown | Highest Breeder Seed Indented Variety of Wheat | Resistant to All three rusts and Bio fortified with Fe and Zn | Cereal Cyst Nematode Resistant Wheat | High Yielding Variety Good for Chappati Quality |

## Milestone Varieties of Barley Developed by SKNAU

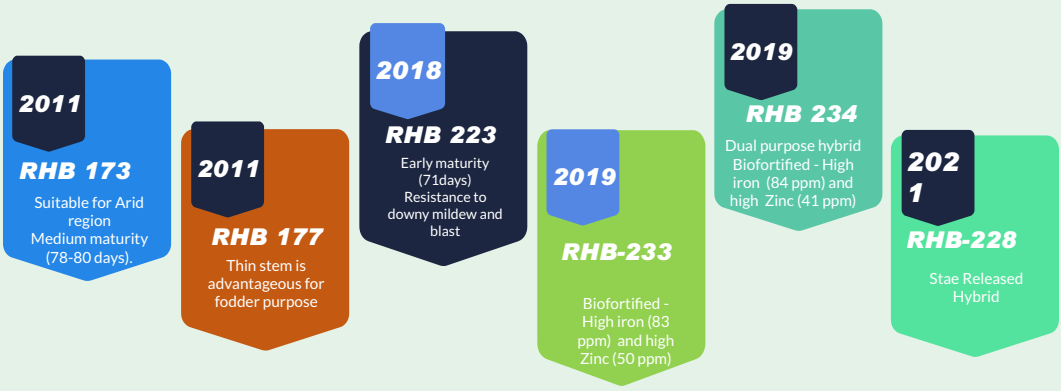
| RDB 1 | BL 2 | Raj Kiran | RD 2715 | RD 2849 | RD 2899 |
|---|---|---|---|---|---|
| 1974 | 1980 | 1982 | 2009 | 2016 | 2018 |
| India's first semi Dwarf mutant Barley | India's First Salinity and alkalinity tolerant variety | India's First Cereal Cyst Nematode Resistant Barley | India's First Dual Purpose Barley Variety | Malt Barley with High Yield and Excellent Malting/Brewing Quality | Feed Barley with High Yield and Resistant to Rust Diseases |

## Milestone Varieties of Arid Legumes Developed by SKNAU

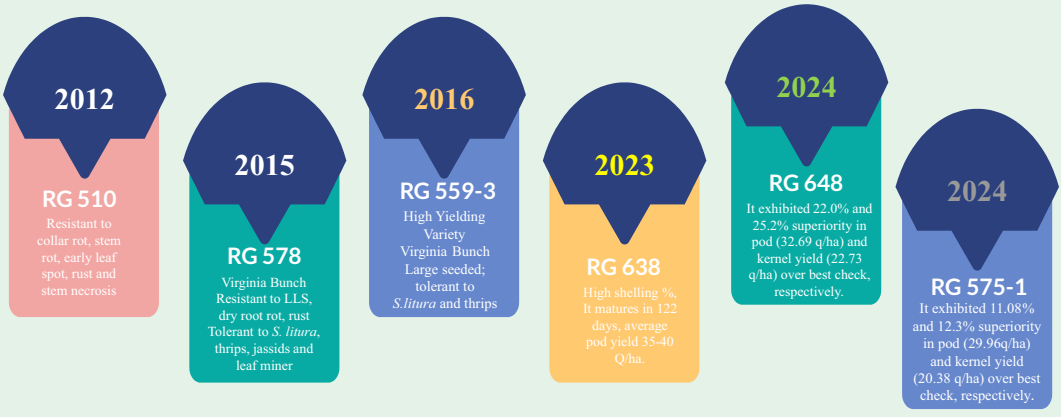
| RGC 1066 | RGC 1038 | RGC 1033 | RGr 12-1 | RGr 18-1 | CPD 119 |
|---|---|---|---|---|---|
| 2007 | 2009 | 2011 | 2018 | 2022 | 2018 |
| Also Known as Lathi, Unbranched Variety Suitable for mixed cropping | Suitable for semi-arid, sandy loam soils and rain-fed condition | Medium maturity (100-105 days), branched with medium height with good grain yield potential (12.71 to 26.85 qt./ha). | Early maturing (87 days), moderately resistance to bacterial blight and Alternaria leaf spot | Medium maturity (90-95 days), moderately resistance to bacterial blight and Alternaria leaf spot with yield potential of 15.0q/ha | Cow Pea Variety, Medium bold (9.11 gm ) white seeded variety and mature in 70 days with seed yield of 6.0-8.0q/ha. |

# Milestone Varieties of Chickpea Developed by SKNAU


# Milestone Varieties of Pearlmillet Developed by SKNAU




# Milestone Varieties of Groundnut Developed by SKNAU




Seed for Farmer
Quality Assurance
Seed: Hope for Future
Quality Enhancement
Seed Production Research


# ॥ सुबीजम् सुक्षेत्रे जायते सम्पद्यते ॥

## A Good Seed in Good Soil Yields Abundant

## उत्तम बीज अच्छी भूमि में भरपूर पैदावार देता है.

adr.seed@sknau.ac.in