

RESEARCH



Chapter - 4





4.1 Agricultural Research Council

The Agricultural Research Council was constituted according to the provision of the Gujarat Agricultural Universities Act 2004 in exercise of the power vested under section 62(1) in pursuance of section 17(5).

Dr. V. P. Chovatia, Hon'ble Vice Chancellor monitored and guided the research activities during the reporting period. The 20th Research Council meeting was organized on January 29, 2024 for approval of new research programs and research activities during the year.

Table 4.1: Members of 20th Agricultural Research Council meeting

| Sr. No. | Name and Designation | Position |
|---------|--|------------------|
| 1 | Dr. V. P. Chovatia, Hon'ble Vice Chancellor | Chairman |
| 2 | Dr. R. B. Madariya, Director of Research & Dean, P.G. Studies | Member Secretary |
| 3 | Dr. N. B. Jadav, Director of Extension Education | Member |
| 4 | Dr. S. J. Solanki, Director of Agriculture, GoG, Gandhinagar | Member |
| 5 | Dr. P. M. Vaghasiya, Director of Horticulture, GoG, Gandhinagar | Member |
| 6 | Dr. F. S. Thakar, Director of Animal Husbandry, GoG, Gandhinagar | Member |
| 7 | Dr. P. D. Kumawat, Principal & Dean, College of Agriculture | Member |
| 8 | Dr. P. M. Chauhan, Principal & Dean, College of Agril. Engg. & Technology | Member |
| 9 | Dr. C. D. Lakhani, Principal, PGIABM | Member |
| 10 | Dr. D. K. Varu, Principal & Dean, College of Horticulture | Member |
| 11 | Dr. V. D. Tarpara, Associate Director of Research, JAU, Junagadh | Member |
| 12 | Dr. B. D. Savaliya, Associate Director of Research, JAU, Junagadh | Member |
| 13 | Dr. D. S. Hirapara, Associate Director of Research, JAU, Targhadia | Member |
| 14 | Dr. V. D. Tarpara, Convener-Social Science Subcommittee | Member |
| 15 | Dr. D. S. Kelaiya, Convener-Plant Protection Subcommittee | Member |
| 16 | Dr. D. K. Varu, Convener-Horticulture & Forestry Subcommittee | Member |
| 17 | Dr. R. M. Javiya, Convener-Crop Improvement Subcommittee | Member |
| 18 | Dr. H. D. Rank, Convener-Agril. Engineering Subcommittee | Member |
| 19 | Dr. P. D. Kumawat, Convener-Crop Production Subcommittee | Member |
| 20 | Dr. H. P. Gajera, Convener-Basic Science Subcommittee | Member |
| 21 | Dr. V. V. Rajani, Retired Research Scientist | Member |
| 22 | Dr. J. H. Vachhani, Retired Research Scientist | Member |
| 23 | Dr. M. G. Valu, Research Scientist (Cotton) | Member |
| 24 | Dr. A. G. Pansuriya, Associate Research Scientist (Wheat) | Member |
| 25 | Dr. R. M. Javaia, Associate Research Scientist (Pulse) | Member |
| 26 | Dr. D. M. Jethava, Associate Professor, CoA, Junagadh | Member |
| 27 | Dr. G. V. Prajapati, Research Scientist (RTTC) | Member |
| 28 | Shri Nileshbhai Oghadhai Dobariya, At- Boriya, Ta.- Jam Kandorana, Dist.- Rajkot | Member |





4.2 Planning and Monitoring

4.2.1 Monitoring

The monthly and quarterly progress reports were collected from the concerned heads of the schemes which were compiled and submitted to the Government quarterly. The problems of the schemes were solved satisfactorily by discussion between the scientists and the Director of Research in two meetings held during the month of November-2023 and February-2024 for evaluation of expenditure of planned schemes and reallocation of the funds, etc.

4.2.2 State Programs

Monitoring of research work is done through a defined set system in the University. The University jurisdiction is comprises of four Agro-climatic Zones viz. North Saurashtra, South Saurashtra, partially North West and Bhal & Coastal Agro-climatic Zones. The authorities of Directorate of Research and Associate Directorate of Research, Junagadh & Targhadia

coordinate, monitor and supervise the implementation of research programs of various schemes in the respective zones. The monitoring is carried out directly on field as well as through presentation of findings in various committees viz. 1) Zonal Research and Extension Action Committee (two zones), twice in a year, 2) Agricultural Research Subcommittee (seven discipline wise), 3) Joint Agricultural Research Subcommittee (one for all disciplines) and 4) Combined Agricultural Research Subcommittee (one for all four State Agricultural Universities). All the committee meetings are held regularly in every year to evaluate the progress of research works, research findings of each experiment, examination and scrutiny of new research programs, examination and refining of findings to be delivered in the form of recommendations. The presentation of research results as well as reports for all research stations is mandatory. The reports are prepared separately for various committees.

Table 4.2.1: List of plan and non-plan research projects functioning in the university
(A) Plan Scheme (Sponsored by State Government of Gujarat)

| Sr. No. | Budget Head | Scheme Name | Sanction Year | Location |
|---------|-------------|--|---------------|---|
| 1 | 12002-00 | Strengthening of research in millet | 1986 | Pearl millet Research Station, Jamnagar |
| 2 | 12006-00 | Strengthening of research in sorghum | 1981 | Cotton Res. Station, Kukada |
| 3 | 12007-00 | Strengthening of research in pulses | 1989 | Pulses Res. Station, Junagadh |
| 4 | 12008-00 | Strengthening of research in oilseed (Groundnut) | 1986 | Oilseed Research Station, Junagadh & Manavadar |
| 5 | 12009-00 | To establish a centre of excellence for cotton research | 1986 | Cotton Research Station, Junagadh and Agril. Research Station, Amreli and Ratia |
| 6 | 12013-00 | Strengthening of scheme of vegetable research at Junagadh | 1995 | Vegetable Research Station, Junagadh |
| 7 | 12027-00 | Scheme for management of salt affected soil & poor quality of under-ground water | 1988 | Dept. of Soil Science & Agri. Chemistry, Junagadh |
| 8 | 12044-01 | Research in Bio-technology | 1995 | Dept. of Biochem., Junagadh |





| Sr. No. | Budget Head | Scheme Name | Sanction Year | Location |
|---------|-------------|---|---------------|---|
| 9 | 12078-00 | Strengthening of research in Dry-farming | 1979 | DFRS, Targhadia & Ratia |
| 10 | 12092-00 | Strengthening of Tissue culture research & development at all campuses | 1990 | Dept. of Genetics & Plant Breeding, Junagadh |
| 11 | 12094-00 | Research for integrated pest mgmt. in fruit crops | 1997 | Dept. of Ento., Junagadh |
| 12 | 12095-00 | Strengthening of horticulture research & development activities | 1997 | Dept. of Horticulture, Junagadh |
| 13 | 12096-00 | Res. on micro irrigation system in Saurashtra region | 1997 | Dept. of Agronomy, Junagadh |
| 14 | 12131-00 | Research on eco-friendly biological fertilizer | 1997 | Dept. of Plant Pathology, Junagadh |
| 15 | 12712-5B | Campus development program (on campus) | 2004 | Directorate of Res., Junagadh |
| 16 | 12903-00 | Establishing of organic farming cell at Junagadh | 2000 | Dept. of Agron., Junagadh |
| 17 | 12905-00 | Proposal for research on watershed management | 2000 | MDFRS, Targhadia; GRS, Dhari & Dept. of SWCE, CAET, Junagadh |
| 18 | 12907-00 | Strengthening of agro-meteorology at JAU | 2000 | Dept. of Agron., Junagadh |
| 19 | 12930-00 | Establishment of new sub-center for research on cumin | 1998 | Polytechnic in Agriculture School, Halvad |
| 20 | 12931-00 | Establishment of new research centre on onion crop | 2003 | Vegetable Research Station, Junagadh & FRS, Mahuva |
| 21 | 12573-00 | Research on tillage technology | 2006 | Dept. of Agron., Junagadh |
| 22 | 12574-00 | Research on rejuvenation of degraded coastal agro-eco systems of Saurashtra | 2006 | Research Training & Testing Centre, Junagadh |
| 23 | 12575-00 | Strengthening research in sesamum | 2006 | Agril. Res. Station, Amreli |
| 24 | 12101-00 | Strengthening of centre of excellence on soil and water management | 2006 | RTTC, Junagadh; MDFRS, Targhadia; ARS (FC), Mahuva & FRS, Mangrol |
| 25 | 12576-00 | Research on post-harvest technology of important crops of Saurashtra | 2006 | Dept. of Processing & Food Engg., CAET, Junagadh |
| 26 | 12582-00 | Strengthening of research on genetically modified cotton | 2009 | Cotton Research Station, Junagadh |





| Sr. No | Budget Head | Scheme Name | Sanction Year | Location |
|--------|-------------|--|---------------|--|
| 27 | 12583-00 | Strengthening of wheat research | 2009 | Wheat Res. Stat., Junagadh |
| 28 | 12584-00 | Strengthening research on castor | 2009 | Main Oilseeds Research Station, Junagadh |
| 29 | 12585-00 | Strengthening research in sugarcane | 2009 | Sugarcane Research Station, Kodinar |
| 30 | 12586-00 | Strengthening of research in plantation and fruit crops at A.R.S. (Fruit crops) | 2009 | Agricultural Research Station (FC), Mahuva |
| 31 | 12587-00 | Conservation of plant biodiversity | 2009 | Dept. of Genetics & Plant Breeding, Junagadh |
| 32 | 12588-00 | Development of arid and semi-arid fruit crops | 2009 | Dept. of Horti., Junagadh |
| 33 | 12590-00 | Establishment of Bt cotton research centre at Surendranagar district | 2011 | Cotton Research Station, Kukada |
| 34 | 12014-00 | Establishment of spices res. centre at Junagadh | 2011 | Vegetable Research Station, Junagadh |
| 35 | 12015-00 | Establishment of bio-fertilizer unit at Junagadh | 2011 | Dept. of Plant Pathology, Junagadh |
| 36 | 12018-00 | Establishment of research centre on onion at Talaja Dist.: Bhavnagar | 2011 | Agriculture Research Station, Talaja |
| 37 | 12019-00 | Strengthening of dry farming research at Jam Khambhaliya | 2012 | Dry Farming Research Station, Jam Khambhaliya |
| 38 | 12020-00 | Strengthening of dry farming research at Vallbhipur | 2012 | DFRS, Jam Khambhaliya and Vallbhipur |
| 39 | 12021-00 | Establishment of mango res. project at Talala | 2012 | Dept. of Horti., Junagadh |
| 40 | 12022-00 | Project on mega seed for quality seed production & distribution | 2012 | Dept. of Seed Science & Tech., Junagadh |
| 41 | 12023-00 | Micronutrients and sulphur research in soils and plants in Saurashtra region | 2012 | Dept. of Ag. Chemistry & Soil Science Junagadh |
| 42 | 12024-00 | Centre of remote sensing and geoinformatics in agriculture | 2012 | Dept. of Soil & Water Conservation Engg., CAET, Junagadh |
| 43 | 12025-00 | Recycling of organic waste for sustainable soil productivity under dry land agri. at Targhadia | 2012 | Main Dry Farming Research Station, Targhadia |





| Sr. No | Budget Head | Scheme Name | Sanction Year | Location |
|--------|-------------|--|---------------|--|
| 44 | 12026-00 | Project for res. on forage crop prod. at Dhari | 2012 | Grassland Res. Station, Dhari |
| 45 | 12028-00 | Aflatoxin and its management in groundnut in Saurashtra region of Gujarat | 2013 | Main Oilseeds Research Station, Junagadh |
| 46 | 12029-00 | Molecular mapping of important traits and their transfer through marker assisted selection (MAS) in groundnut and cotton | 2013 | Dept. of Biochemistry, Junagadh |
| 47 | 12030-00 | Studies on effect of climate change on fruit crops of Saurashtra region | 2013 | Dept. of Horticulture, Junagadh |
| 48 | 12031-00 | Crop improvement in papaya at Junagadh | 2014 | |
| 49 | 12032-00 | Integrated pest management in seed spices at Junagadh | 2014 | Dept. of Entomology, Junagadh |
| 50 | 12035-00 | Rapid generation advancement based modern breeding approaches for industry preferred traits in groundnut | 2023 | Main Oilseeds Research Station, Junagadh |

(B) Non-plan Scheme (Sponsored by State Government of Gujarat)

| Sr. No. | Budget Head | Name of Program | Sanction Year | Location |
|---------|-------------|--|---------------|--|
| 1 | 3226 | Scheme of design experiment | 1980 | Dept. of Agril. Stat., Junagadh |
| 2 | 5002 | Scheme for research in bajra | 1985 | Pearl millet Res. Stat., Jamnagar |
| | | | | Agril. Res. Station, Talaja |
| 3 | 5004 | Scheme for research in wheat | 1995 | Wheat Res. Station, Junagadh |
| | | | | Fruit Res. Station, Mangrol |
| 4 | 5006 | Scheme for research in sorghum | 2011 | Cotton Res. Station, Kukada |
| 5 | 5007 | Project for the research in pulses | 1975 | Pulses Res. Station Junagadh |
| 6 | 5008 | Scheme for oilseed research | 1962 | Main Oilseeds Research Station, Junagadh |
| | | | 1973 | Agril. Research Station, Amreli |
| | | | 1985 | Pearl millet Res. Stat., Jamnagar |
| 7 | 5008 | Scheme for oilseed research | 1979 | Sugarcane Res. Stat., Kodinar |
| | | | 1979 | Oilseed Res. Station, Manavdar |
| 7 | 5009 | Scheme for strengthening of research in cotton investigation of fiber crops other than cotton, development of remie fiber. | 1985 | Agril. Research Station, Amreli |
| | | | 1985 | Cotton Res. Station, Khapat |
| | | | 2002 | Cotton Research Station, Junagadh |





| Sr. No. | Budget Head | Name of Program | Sanction Year | Location |
|---------|-------------|--|---------------|--|
| 8 | 5011 | Scheme for research in sugarcane | 1971 | Sugarcane Res. Stat., Kodinar |
| 9 | 5012 | Scheme for res. in grasses forage | 1985 | Grassland Res. Station, Dhari |
| 10 | 5013 | Strengthening of research in vegetable (Tomato) | 1962 | Vegetable Research Station, Junagadh |
| 11 | 5014 | Scheme for research and improvement in fruit crops | 1961-62 | Fruit Res. Station, Mangrol |
| | | | | Agril. Res. Stat. (FC), Mahuva |
| | | | | Dept. of Horticulture, Junagadh |
| 12 | 5018 | Scheme for res. studies in agri. economics | 1972 | Dep. of Agril. Economics, Junagadh |
| 13 | 5020 | Scheme for research in agriculture chemistry & soil science | 1972 | Dept. of Soil Science & Agri. Chemistry, CoA, Junagadh |
| 14 | 5025 | Project for the research in agronomy and crop husbandry | 2005 | Dept. of Agronomy, Junagadh |
| 15 | 5026 | Project for the res. in pest control and other entomological aspect | 1960 | Dept. of Entomology, Junagadh |
| 16 | 5042 | Strengthening of dry farming research station | 1965 | Dry Farming Res. Stat., Ratia |
| | | | 1979 | Main Dry Farming Research Station, Targhadia |
| | | | 1967 | DFRS, Jam-Khambhalia |
| | | | 1964 | DFRS Vallbhipur |
| | | | 2011 | Cotton Res. Stat., JAU, Kukada |
| | | | 1975 | Grassland & Agril. Res. Station, Dhari |
| | | | 1947-48 | Dept. of Seed Sci. & Tech., Junagadh |
| | | | 1995 | Cotton Res. Stat., JAU, Khapat |
| | | | 1967 | Dept. of Agronomy, Junagadh |
| 17 | 5044 | Project for the res. in plant diseases and other pathological aspect | 1985-86 | Department of Plant Pathology, Junagadh |
| 18 | 5046-A | Study of biology investigation & control of weed control, botanical garden and cytogenesis | 1969 | Dept. of Genetics & Plant Breeding, Junagadh |
| | B | | | |
| | C | | | |
| 19 | 5073 | Research in Agricultural Engg. | 1962-63 | RTTC, Junagadh |
| 20 | 5075 | Establishment of Seed technology cell | 1981 | Directorate of Research, Junagadh |
| 21 | 7082-A | National Agriculture Research project | 1987 | Main Oilseed Research Station, Junagadh |
| | 7082-B | | 1995 | DFRS, Jam-Khambaliya |
| | 7082-B | | 1988 | Pearl millet Res. Stat., Jamnagar |
| | 7082-C | | 1982 | Grassland Res. Station, Dhari |





4.2.3 Zonal Research and Extension Action Committee (ZREAC)

This committee is functioning at Zonal level of South Saurashtra and North Saurashtra Agro-climatic Zones and two meetings are organized in the year *viz.*, *kharif* and *rabi-summer*. The research programs/ works carried out in different schemes/ projects are presented by scientists in the meeting. The power point presentations are made in the house for thorough discussion and refinement of each ongoing project. In this meeting, scientists from different disciplines as well as officers from line departments are participating and debating on the results of the projects as well as suggest necessary improvement in new technical programs for future research work. The officers from

the line departments are also presenting feedback as well as overall agriculture situations in their regions. They also suggest the inputs for new area of research. It is the multidisciplinary task to evaluate the research results of different disciplines.

During the year 2023-24, four meetings of ZREAC were organized; two each at Junagadh and Targhadia. In the ZREAC meetings, **five crop varieties; 34 farmers' recommendations; 28 scientific recommendations and 85 new technical programs** were approved (Table 4.2.2). The feedbacks as well as suggestions were also received from the officers of line departments and KVKS.



**Table 4.2.2: Zonal Research Extension Action Committee (ZREAC) meeting**

| Meeting | Place | Date | No. of Recommendations approved | | New Technical Programs |
|--|-----------|---------------------|---------------------------------|------------|------------------------|
| | | | Farmers | Scientific | |
| 39 th ZREAC (<i>Rabi-summer</i>) of South Saurashtra Agro-climatic Zone | Junagadh | October 17-18, 2023 | 13 | 09 | 14 |
| 39 th ZREAC (<i>Rabi-summer</i>) of North Saurashtra Agro-climatic Zone | Targhadia | October 10, 2023 | - | - | 06 |
| 40 th ZREAC (<i>kharif</i>) of South Saurashtra Agro-climatic Zone | Junagadh | January 16-17, 2024 | 04*+14 | 13 | 58 |
| 40 th ZREAC (<i>kharif</i>) of North Saurashtra Agro-climatic Zone | Targhadia | January 19, 2024 | 01*+07 | 06 | 07 |
| | | Total | 05*+34 | 28 | 85 |

*No. of crop varieties released.

4.2.3 Agricultural Research Subcommittee (AGRESCO – Discipline-wise)

There are Seven sub-committees of research functioning in the university to manage the research activities mentioned herein:

Table 4.2.3: Agricultural Research Subcommittees

| Sub Committee | Subject areas of Research |
|--------------------------|---|
| Crop Improvement | Development of variety and maintenance of germplasm of mandate crops of the region |
| Crop Production | Agronomy, Agricultural Chemistry & Soil Science, Weed Control |
| Plant Protection | Entomology & Plant Pathology |
| Horticulture & Forestry | Fruits Science, Vegetables Science, Floriculture & Landscape Architecture, Post-Harvest Technology |
| Agricultural Engineering | Soil & Water Conservation Engineering, Farm Machinery & Power Engineering, Renewable Energy Engineering, Processing & Food Engineering, Irrigation & Drainage Engineering |
| Basic Science | Biochemistry, Biotechnology, Plant Physiology, Plant molecular Biology |
| Social Science | Agricultural Economics, Agricultural Extension Education, Agricultural Engineering Extension Education, animal Husbandry Extension Education, Agricultural Statistics and Agribusiness Management |

The members of the committees are senior scientists of the university working in various departments/ projects, subjects matter specialists and representatives of state line departments. The conveners of all committees are nominated by the

Director of Research for two years to organize the meeting and also issuing the proceedings. The meeting of all committees is held annually to discuss and to evaluate the research results. The members also discuss the new technical programs as well as the





The members of the committees are senior scientists of the university working in various departments/ projects, subjects matter specialists and representatives of state line departments. The conveners of all committees are nominated by the Director of Research for two years to organize the meeting and also issuing the proceedings. The meeting of all committees is held annually to discuss and to evaluate the research results. The members also discuss the new technical programs as well as the



Various Agricultural Research Sub Committee meetings were held during February to March 2024 at Junagadh. **Five new crop varieties, 35 farmers' recommendations, 27 scientific recommendations**

recommendations for farmers and scientific community. The scientists presenting the results of various schemes/ projects will refine the reports, recommendations and new technical programs for next season. The suggestions made in the meetings are incorporated in the reports. Each and every proposal and program pertaining to the various disciplines are discussed critically. The conveners of various sub committees present the proceedings in the Joint AGRESCO meeting.



and 87 new technical programs were approved.

The reports of the work carried out at various research schemes of the university were also presented and approved.

Table 4.2.4: Various 20th AGRESCO (Discipline wise) subcommittee meetings

| Sub Committee | Date | No. of Recommendations | | New Technical Programs | On-going Research Projects |
|--------------------------|------------------------------|------------------------|------------|------------------------|----------------------------|
| | | Farmers | Scientific | | |
| Social Science | February 13, 2024 | 01 | 10 | 19 | 06 |
| Basic Science | February 15-16, 2024 | - | 01 | 02 | 25 |
| Agricultural Engineering | February 20-21, 2024 | 13 | 03 | 19 | 25 |
| Horticulture & Forestry | February 22, 2024 | 03 | - | 09 | 31 |
| Plant Protection | February 27-28, 2024 | 07 | 07 | 14 | 341 |
| Crop Production | February 29 - March 01, 2024 | 09 | 06 | 20 | 150 |
| Crop Improvement | March 05-06, 2024 | 05*+02 | - | 04 | - |
| | | 05*+35 | 27 | 87 | 578 |

*No. of crop varieties released





4.2.5 Joint Agricultural Research Subcommittee (Joint AGRESCO)

Joint Agricultural Research Subcommittee meeting is held annually to discuss research proposals and results. The committee finalizes the recommendations and new technical programs to be undertaken in various disciplines. This committee comprises of the Director of Research, Associate Director of Research, the senior scientists of various disciplines, representatives of line departments etc. The conveners of various AGRESCO subcommittee present the findings of their respective committees for approval. This committee meeting is presided over by the Hon'ble Vice Chancellor. Joint AGRESCO will finalize the recommendations and new technical programs for research, which is to be presented in the ensuing 20th Combined AGRESCO of State Agricultural Universities.

The 20th Joint AGRESCO meeting of JAU was held at College of Agriculture, JAU, Junagadh on March 22, 2024 under the chairmanship of Dr. V. P. Chovatia, Hon'ble Vice Chancellor, JAU, Junagadh. All AGRESCO conveners of various committees presented their reports and approved. **Five new crop varieties; 33 farmers' recommendations; 28 scientific recommendations and 85 new technical programs were approved in the meeting.**



4.2.6 Combined Agricultural Research Subcommittee (One for four State Agricultural Universities)

This is the apex body to finalize the research recommendations as well as the new technical programs at state level. The meeting is held at the venues in the rotational mode. The members of this committee include Hon'ble Vice Chancellors, Directors of Research, Directors of Extension Education, Associate Directors of Research, Conveners of various AGRESCO subcommittees and senior scientists of various disciplines of all State Agricultural Universities. Director of Agriculture and Director of Horticulture are also the members of the committee. Separate sessions are organized discipline-wise, in which conveners of various AGRESCO subcommittee present the reports of their respective universities. In the concluding session, the conveners from each subcommittee present the final report of research in the meeting. The output of research in the form of recommendations/ technologies is published in the form of proceedings and supplied to the all concerned for implementation.

The 20th Combined Meeting of Agricultural Research Council (AGRESCO-2024) of SAUs was held through virtual mode, organized and hosted by Navsari Agricultural University, Navsari during MAY, 10 - 17, 2024. Hon'ble Vice Chancellors of JAU, AAU, NAU and SDAU namely Dr. V. P. Chovatia, Dr. K. B. Kathiria, Dr. Z. P. Patel and Dr. R. M. Chauhan were remained present during the meeting.





During 20th Combined AGRESCO meeting, five new crop varieties viz., Groundnut (GG 101, GG 24 and GG 42), Pigeonpea (GT 111) and Endorsement of Pearl Millet Hybrid (GHB 1294) of JAU were recommended for release in the state. Besides, 22 technologies/recommendations were made for farmers and 30

recommendations were made for scientific community. In addition, as many as 75 new technical programs were formulated to initiate the new research programs for the solutions of the applied and basic problems of agriculture and allied fields.

Table 4.2.5: 20th Combined AGRESCO meeting of SAUs

| Sub Committee | No. of Recommendations | | New Technical Programs |
|--------------------------|------------------------|------------|------------------------|
| | Farmers | Scientific | |
| Crop Improvement | 05* | 01 | 01 |
| Crop Production | 06 | 08 | 13 |
| Plant Protection | 03 | 10 | 11 |
| Horticulture & Forestry | 03 | - | 08 |
| Agricultural Engineering | 10 | 03 | 18 |
| Basic Science | - | 01 | 05 |
| Social Science | - | 07 | 19 |
| Total | 05*+22 | 30 | 75 |

*No. of crop varieties released



4.2.7 All India Coordinated Research Projects (AICRP)

Apart from the mechanism of evaluating and monitoring the research programs / schemes at university level; the projects sanctioned by ICAR, the annual workshop and review meetings in different universities of India are being organized. Total 17 AICRP projects are operating in the university. The monitoring of the projects is also carried out by respective Project Director every year at field level.

After five years, the evaluation of performance of each research project is also carried out by QRT committee comprising of leading senior scientists nominated by the ICAR. The research scientist of the project presents results to the quinquennial review team (QRT). All AICRP projects operating in the university are regularly reviewed and monitored as per the ICAR norms. They identify and evaluate the performance of the research projects according to national standards.



**Table 4.2.6 Monitoring of AICRP trial at Junagadh Agricultural University**

| Name of Project | Department/ Research Station | Date of Monitoring | Name and designation of member of monitoring |
|-----------------------|---|---------------------|--|
| AICRP on PEASEM | Dept. of Renewable Energy Engg., CAET, Junagadh | April 20-22, 2023 | Quinquennial Review Team |
| AICRP on Pearl millet | Pearl millet Research Station, JAU, Jamnagar | October 02, 2023 | Dr. S. K. Jain, I/c AICRP & Division Head (GPB); Dr. Seema Sharma, Associate Professor (Agronomy), Dr. R. S. Sharma, Assistant Professor (Pl. Patho.) and Dr. R. S. Bajia, STA (Entomology), RARI, Durgapura, Jaipur |
| AICRP on FIM | Dept. of Farm Machinery & Power Engg., CAET, Junagadh | October 03, 2023 | Dr. K. N. Agrawal, Project Coordinator AICRP on FIM |
| AICRP on Sesame | Agricultural Research Station, JAU, Amreli | October 05-06, 2023 | 1. Dr. Rajani Bisen, Geneticist; Dr. A. K. Pandey, Entomologist and Dr. K. N. Gupta, Pathologist, PCU, Jabalpur 2. Dr. C. Harishudan, Agronomist, Vridhachalam 3. Dr. D. R. Mishra, Breeder, Dhenkanal |
| AICRP on Cotton | Agricultural Research Station, JAU, Amreli | October 09, 2023 | 1. Dr. G. T. Behere, Head (Crop Protection); Dr. Shailesh Gawande, Senior Scientist and Dr. Rahul Phuke, Senior Scientist, ICAR-CICR, Nagpur 2. Dr. A. Veeraputhiran, Professor; TNAU, Srivilliputtur 3. Dr. A. Subramani, Professor, TNAU, Coimbatore 4. Sh. Basavaraj Huggi, M/s Rama Agri Genetics(I), Pvt. Ltd. |
| AICRP on Groundnut | Main Oilseeds Research Station, JAU, Junagadh | October 17, 2023 | 1. Dr. Prasanna Rajesh, Pl. Br. And Dr. K. Vemana, Pathologist, ARS, Kadiri 2. Dr. K. Maheshwara Reddy, Agronomist, RARS, Tirupati 3. Dr. Kiran kumar Reddy, Soil scientist, ICAR-DGR, Junagadh |
| AICRP on Castor | Main Oilseeds Research Station, JAU, Junagadh | December 07, 2023 | 1. Dr. P. Duraimurugan Principal Scientist & Co-PI (Ento.) and Dr. T. Manjunath Sr. Scientist (Pl. Br.), ICAR-IIOR, Hyderabad 2. Dr. Y. Pavan kumar Reddy, Agronomist, ANGRAU, Ananthapuramu, A.P. |





| Name of Project | Department/ Research Station | Date of Monitoring | Name and designation of member of monitoring |
|-------------------|---|----------------------|--|
| AICRP on PEASEM | Dept. of Renewable Energy Engg., CAET, Junagadh | January 19-20, 2024 | Dr. Rakesh Sharda, Project Coordinator, AICRP on PEASEM, CIPHET, Ludhiana |
| AICRP on Wheat | Wheat Res. Station, JAU, Junagadh | February 16, 2024 | Dr. Vikas Gupta, PS; Dr. Ravindra Kumar and Dr. Niraj Kumar, Sci., ICAR-IIWBR Karnal |
| AICRP on Chickpea | Pulses Research Station | February 21-23, 2024 | Dr. Shailesh Tripathi, Project Coordinator Indian Institute of Pulses Research, Kanpur |

Table 4.2.7: List of AICRPs functioning in the university (ICAR 75 % & State Govt. 25 %)

| Sr. No. | Budget Head | Scheme | Sanction Year | Location |
|---------|-------------|---|---------------|--|
| 1 | 2002-00 | AICRP on Pearl millet | 1969 | Pearl millet Res. Stat., Jamnagar |
| 2 | 2004-00 | AICRP on Wheat | 1987 | Wheat Research Station, Junagadh |
| 3 | 2008-01G | AICRP on Groundnut | 1987 | Main Oilseeds Research Station, Junagadh |
| 4 | 2008-1C | AICRP on Castor | | |
| 5 | 20-1SM | AICRP on Sesame | 1986 | Agricultural Res. Station, Amreli |
| 6 | 2009-00 | AICRP on Cotton | 1967 | Cotton Res. Station, Junagadh |
| 7 | 2013-01 | AICRP on Vegetable | 1988 | Vegetable Res. Station, Junagadh |
| 8 | 2258-D | AICRP on Farm Implements & Machinery | 2015 | Dept. of Farm Machinery & Power Engg., CAET, Junagadh |
| 9 | 2030-01 | AICRP on Long term fertilizer experiments | 1999 | Dept. of Soil Science & Agri. Chemistry, CoA, Junagadh |
| 10 | 2040-00 | AICRP on Farming (Old-Cropping System Res.) (CSR Sub Centre) | 1989 | Department of Agronomy, CoA, Junagadh |
| 11 | 2042-01 | AICRP on Dryland agriculture | 1971 | Main Dry Farming Research Station, Targhadia |
| 12 | 2076-02 | AICRP on Seeds (Crops) (Old BSP-NSP seed technology research) | 2023 (1984) | Dept. of Seed Science and Technology , Junagadh |
| 13 | 2258-00 | AICRP on Post-harvest Technology | 1980 | Dept. of Processing & Food Engg., CAET, Junagadh |
| 14 | 2374-00 | AICRP on Chickpea | 1993 | Pulses Research Station, Junagadh |
| 15 | 2374-05 | AICRP on Pigeon pea | 2000 | Pulses Research Station, Junagadh |
| 16 | 2258-B | AICRP on Plasticulture engineering & technologies | 2005 | Dept. of Renewable Energy Engg., CAET, Junagadh |





| Sr. No. | Budget Head | Scheme | Sanction Year | Location |
|---------|-------------|---|---------------|--|
| 17 | 2258-A | AICRP on Irrigation Water Management (old-Ground Water Utilization) | 2004 | Dept. of Soil & Water Conservation Engg., CAET, Junagadh |

4.2.8 External Funded Research Projects

The university is also undertaking various external funded research projects of ICAR, Govt. of India, Govt. of Gujarat and private Agencies. According to their terms and conditions, research work is carried out and research report is submitted to concern funding agency.

Table 4.2.8: List of External Funded Research Projects functioning in the university

| Sr. No. | Budget Head | Scheme Name | Sanction Year | Sponsoring Agency | Location |
|---------|------------------|---|---------------|-------------------------|--|
| 1 | 18005-10 | Genetically enhanced micronutrient-dense pearl millet grains for improved human nutrition in the India | 2010 | ICRISAT, Hyderabad | Main Pearl millet Research Station, Jamnagar |
| 2 | 18053 | Scheme for creating permanent machinery for studying the cost of cultivation/ production of principal crops grown in Gujarat state (Non plan under DAG) | 1984 | DAG, Govt. of Gujarat | Dept. of Agril. Economics, Junagadh |
| 3 | 18005-04, 05 &15 | Agricultural demonstration activities in SSP command area Phase-II | 2010 | SSNNL, Govt. of Gujarat | DFRS, Vallbhipur, Agri. School, Halvad and Cotton Res. Stat., Kukada |
| 4 | 18005-18 | Establishment of model organic farm | 2015 | GoG | Dept. of Agron., Junagadh |
| 5 | 18005-01 | Experimental agro-met advisory services | 1996 | GoI | Dept. of Agronomy, Junagadh/MDFRS, Targhadia |
| 6 | 18126-02 | Centrally sponsored scheme (Spices) | 2006 | GoI | Vegetable Res. Station, Junagadh |
| 7 | 18127-00 | Seed production in agricultural crops and fisheries | 2006 | GoI | (Oilseed-Megaseed) Junagadh |
| 8 | 18127-00 | Seed production in agril. crops and fisheries (Oilseeds-Megaseeds) | 2006 | GoI | Main Oilseed Research Station and Dept. of Seed Sci. & Tech., Junagadh |
| 9 | 18803-01 to 12 | Megaseed revolving fund | 2006 | | |
| 10 | 18804-01 to 04 | Seed production in agricultural crops | 2006 | | |





| Sr. No. | Budget Head | Scheme Name | Sanction Year | Sponsoring Agency | Location |
|---------|-------------|---|---------------|-------------------|--|
| 11 | 18005-06 | Forecasting agril. output using space, agro meteorology and land based observations (FASAL) | 2011 | GoI | Dept. of Agronomy, Junagadh |
| 12 | 2012 | All India network research project on onion and garlic | 2009 | ICAR-Network | Vegetable Res. Station, Junagadh |
| 13 | 2030-2 | Soil test based fertilizers application for targeted yield of Bt cotton in Saurashtra region of Gujarat | 2010 | ICAR-Network | Dept. of Soil Science & Agri. Chem., Junagadh |
| 14 | 2042-02 | National initiative on climate resilient agriculture - dry land | 2011 | ICAR-Network | MDFRS Targhadia |
| 15 | 2002-5 | Implementation of protection of plant varieties and farmer's rights legislation | 2002 | ICAR-Network | Pearl millet Research Station, Jamnagar |
| 16 | 2027-04 | Network project on market intelligence | 2013 | ICAR-Network | Dept. of Agril. Eco., Junagadh |
| 17 | 2004-1 | Project for frontline demonstration in wheat | | ICAR-Network | Wheat Research Station, Junagadh |
| 18 | 2008-3 | Project for frontline demonstration in sesame | 2007 | ICAR-Network | Agriculture Res. Station, Amreli |
| 19 | 2008-12 | Scheme for breeder seed production of oilseeds crops (ICAR revolving fund) | 2007 | ICAR-Network | Main Oilseed Research Station, Junagadh |
| 20 | 2009-6 | Front line demonstration on cotton | 2001 | ICAR-Network | Cotton Research Station, Junagadh |
| 21 | 2076-3 | Central sector special food grain production of breeder seed (Revolving fund) | - | ICAR-Network | Pulses Research Station, Junagadh |
| 22 | 2254 | Study storage losses of food grains | 2013 | ICAR-Network | Dept. of PFE, CAET, Junagadh |
| 23 | 2374-1 | FLD on Chickpea | - | ICAR-Network | Pulses Research Station, Junagadh |
| 24 | 2374-6 | FLD on Pigeon pea | | | |
| 25 | 2504-00 | Revolving fund horticulture (Nursery) | - | ICAR-Network | Dept. of Horti., Junagadh |
| 26 | 2704-40 | Project for frontline demonstration on groundnut | 1999 | ICAR-Network | Main Oilseed Res. Station, Junagadh/ ARS, Amreli |





| Sr. No. | Budget Head | Scheme Name | Sanction Year | Sponsoring Agency | Location |
|---------|-------------|---|---------------|-------------------|--|
| 27 | 2704-43 | Project for frontline demonstration in pearl millet | 1989 | ICAR-Network | Main Pearl millet Research Station, Jamnagar |
| 28 | 2002-07 | Consortia research platform (CRP) on biofortification | 2014 | | |
| 29 | 18132 | Creation of seed-hubs for increasing indigenous production of pulses in India | 2016 | ICAR-Network | Dept. of Seed Science & Tech., Junagadh |
| 30 | 2009-09 | Testing of Bt. Cotton | 2017 | ICAR | Cotton Research Station, Junagadh |
| 31 | 18246-91 | River flow simulations integrating satellite data in forested catchment | 2017 | GoG | CAET, JAU, Junagadh |
| 32 | 18009-34 | Seed infrastructure under NMOOP | 2017 | GoG | Agril. Res. Station, JAU, Amreli |
| 33 | 2009-07 | Insecticide Resistance Management: Dissemination of pink bollworm management strategies | 2018 | ICAR-Network | Cotton Research Station, Junagadh |
| 34 | 18132-02 | Creation of Seed-Hubs for Enhancing Quality Seeds availability of major Oilseeds crops - Groundnut under NFSM - Oilseed mission | 2018 | GoI | Dept. of Seed Science & Tech., Junagadh |
| 35 | 2260-3 | Development of Protocols for Procurement, Safe Storage and Milling Outturn of Major Pulses | 2019 | ICAR-Network | CAET, JAU, Junagadh |
| 36 | 2008-19 | Mainstreaming of Sesame germplasm for productivity enhancement through genomics assisted core development and trait discovery | 2020 | ICAR-Network | Agricultural Research Station, Amreli |
| 37 | 18247-35 | Product testing for pesticides residue to promote organic farming and export of Agricultural produce (RKVY) | 2019 | RKVY | Department of Biotechnology, Junagadh |
| 38 | 18247-36 | Seed Replacement Rate Enhancement | - | RKVY | Dept. of Seed Sci. & Tech., Junagadh |
| 39 | 18247-37 | Centre of Excellence for quality testing of cotton | 2019 | RKVY | Cotton Research Station, Junagadh |





| Sr. No. | Budget Head | Scheme Name | Sanction Year | Sponsoring Agency | Location |
|---------|-------------|--|---------------|--------------------|--|
| 40 | 18247-41 | Commercial Exploitation of Date palm through Tissue culture | 2019 | RKVV | Dept. of Genetics & Plant Breeding, Junagadh |
| 41 | 18247-43 | Strengthening of seed multiplication farm | 2019 | RKVV | Dept. of Seed Sci.e & Tech., Junagadh |
| 42 | 18008-70 | Identification of Marker and Genomic Regions Associated with Aflatoxin Resistance in Peanut | 2021 | ICRISAT, Hyderabad | Main Oilseed Res. Station, Junagadh |
| 43 | 18246-96 | Modeling of water fluxes and ground water discharge using 1D-2D coupled model and in situ measurements in the Gir forest catchment | 2021 | GoI | CAET, JAU, Junagadh |

4.3 Crop Improvement

Crop Improvement includes development of new crop varieties and maintenance of germplasm of mandate crops of the region.

The breeder seeds of different crops were produced

to fulfill the demand of private and public sectors as per the national and state indents under coordination of concern crop scientist are given in following table. The required nucleus seeds of different crops were also produced for the breeder seed production in the ensuing season.

Table 4.3.1 Production of Nucleus / Breeder Seeds

| Sr. No. | Crop | Variety | Nucleus Seed (q) | Breeder Seed (q) | | Total (q) |
|---------|-----------|-------------|------------------|------------------|--------|-----------|
| | | | | National | State | |
| 1 | Groundnut | SBXI (J-11) | 0.10 | 0.00 | 0.00 | 0.10 |
| | | GG-2 | 3.30 | 0.00 | 30.00 | 33.30 |
| | | GG-5 | 2.70 | 0.00 | 20.10 | 22.80 |
| | | GG-7 | 5.10 | 20.10 | 10.20 | 35.40 |
| | | GG-8 | 0.50 | 0.00 | 0.00 | 0.50 |
| | | GJG-9 | 10.20 | 150.00 | 50.10 | 210.30 |
| | | GJG-31 | 2.10 | 70.10 | 3.00 | 75.20 |
| | | GJG-32 | 50.10 | 710.00 | 300.00 | 1060.10 |
| | | GJG-33 | 1.50 | 15.00 | 6.00 | 22.50 |
| | | GG-35 | 15.00 | 150.00 | 90.00 | 255.00 |
| | | GAUG-10 | 10.20 | 100.00 | 50.10 | 160.30 |
| | | GG-11 | 3.60 | 0.00 | 60.00 | 63.60 |
| | | GG-16 | 0.50 | 0.00 | 0.00 | 0.50 |
| | | GJG-17 | 1.50 | 0.00 | 50.10 | 51.60 |
| | | GJG-18 | 1.50 | 10.20 | 0.00 | 11.70 |





| Sr. No. | Crop | Variety | Nucleus Seed (q) | Breeder Seed (q) | | Total (q) |
|---------|--------------|------------------|------------------|------------------|----------------|----------------|
| | | | | National | State | |
| 1 | | GJG-19 | 2.10 | 10.20 | 0.00 | 12.30 |
| | | GG-20 | 20.10 | 70.10 | 600.00 | 690.20 |
| | | GG-21 | 1.80 | 0.00 | 5.10 | 6.90 |
| | | GJG-22 | 25.10 | 120.00 | 510.00 | 655.10 |
| | | GG-23 | 15.00 | 90.00 | 50.10 | 155.10 |
| | | GJG HPS-1 | 0.50 | 0.00 | 0.00 | 0.50 |
| | | GJG HPS-2 | 1.50 | 5.10 | 0.00 | 6.60 |
| | | GG-37 | 15.10 | 50.10 | 50.10 | 115.30 |
| | | J-87 | 0.10 | 0.00 | 0.00 | 0.10 |
| | | GG-41 | 2.10 | 3.00 | 1.00 | 6.10 |
| | | GG-38 | 3.60 | 0.00 | 20.10 | 23.70 |
| | | GG-39 | 10.20 | 0.00 | 0.00 | 10.20 |
| | | GG-40 | 10.20 | 1.20 | 0.00 | 11.40 |
| | | Sub Total | 215.30 | 1575.10 | 1906.00 | 3696.40 |
| 2 | Pearl millet | GHB 538 Improved | - | - | 0.77 | 0.77 |
| | | GHB 1294 | 0.064 | - | 0.17 | 0.234 |
| | | GHB 1225 | 0.006 | - | 1.70 | 1.706 |
| | | GHB 1231 | 0.009 | - | 5.45 | 5.459 |
| | | GHB 1129 | 0.016 | - | 3.85 | 3.866 |
| | | Sub Total | 0.095 | - | 11.94 | 12.035 |
| 3 | Sesame | G.Til 2 | 0.50 | 0.12 | 4.78 | 5.400 |
| | | G.Til 3 | 0.30 | 0.15 | 2.53 | 2.980 |
| | | G.Til 4 | 0.30 | 3.15 | 2.36 | 5.810 |
| | | GJT 5 | 0.30 | 2.50 | 1.00 | 3.800 |
| | | G.Til 6 | 0.30 | 2.60 | 2.60 | 5.500 |
| | | G.Til 10 | 0.10 | - | 0.90 | 1.000 |
| | | G.Til 11 | 0.10 | - | - | 0.100 |
| | | Purva 1 | 0.05 | - | 1.09 | 1.140 |
| | | Sub Total | 1.95 | 8.52 | 15.26 | 25.73 |





| Sr. No. | Crop | Variety | Nucleus Seed (q) | Breeder Seed (q) | | Total (q) | |
|---------|---|------------------|------------------|------------------|---------------|--------------------|--|
| | | | | National | State | | |
| 4 | Chickpea | GG 1 | 0.40 | - | - | 0.40 | |
| | | GG 2 | 1.50 | 1.50 | 9.00 | 12.00 | |
| | | GJG 3 | 7.00 | 110.00 | 20.00 | 137.00 | |
| | | GG 4 | 0.40 | - | - | 0.40 | |
| | | GG 5 | 8.00 | 185.00 | 80.00 | 273.00 | |
| | | GJG 6 | 5.00 | 2.00 | 50.00 | 57.00 | |
| | | GG 7 | 3.00 | 25.00 | - | 28.00 | |
| | | GKG 1 | 3.00 | 0.50 | 15.00 | 18.50 | |
| | | GG 8 | 2.00 | - | 12.00 | 14.00 | |
| | | Sub Total | 30.30 | 324.00 | 186.00 | 540.30 | |
| 5 | Pigeon pea | GJP 1 | 0.22 | - | 8.00 | 8.22 | |
| | | Sub Total | 0.22 | - | 8.00 | 8.22 | |
| 6 | Black gram | GU 1 | 0.50 | 0.30 | 8.50 | 9.30 | |
| | | Sub Total | 0.50 | 0.30 | 8.50 | 9.30 | |
| 7 | Wheat | GW 366 | 2.00 | 54.00 | 4.00 | 60.00 | |
| | | GJW463 | 3.40 | 43.20 | 41.80 | 88.40 | |
| | | GW 496 | - | - | 75.20 | 75.20 | |
| | | Lok 1 | - | - | 30.00 | 30.00 | |
| | | Sub Total | 5.40 | 97.20 | 151.00 | 253.60 | |
| 8 | Cotton | G. Cot 38 | 0.005 | - | - | 0.005 | |
| | | GJC-102 | 0.005 | - | - | 0.005 | |
| | Cotton: Parents of G. Cot. Hy.-24 and 26 BG II | GJHV-503 | 0.602 | - | 0.602 | 1.204 | |
| | | GJHV-517 | 0.782 | - | 0.782 | 1.564 | |
| | | Sub Total | 1.394 | - | 1.384 | 2.778 | |
| | | | | | | Grand total | |
| | | | | | | 4548.36 | |

Estimated Production data

The crop seeds produced in the farms were processed at Megaseed processing plant. The processed good quality truthful/ certified/ foundation seeds were sold to farmers under the trade name of "Gir Sawaj" and its detail is given in below table. Very good response was observed among the farmers to avail this facility.





Table 4.3.2 Production of 'Gir Sawaj' brand truthful, foundation and certified seeds of field crops under mega- seed and Seed Hub projects

| Sr. No. | Crops | Production (q) | | |
|--------------------|-----------------|----------------|---------------|-----------------|
| | | Truthful | Foundation | Certified |
| 1 | Groundnut | 964.38 | 470.75 | 1830.50 |
| 2 | Chickpea | 643.50 | 76.80 | 945.60 |
| 3 | Sesame | 32.59 | - | - |
| 4 | Wheat | 2917.50 | - | - |
| 5 | Cotton | 40.00 | - | - |
| 6 | Castor | 42.00 | - | - |
| 7 | Cumin | 24.00 | - | - |
| 8 | Coriander | 30.00 | - | - |
| 9 | Soybean | 624.40 | - | - |
| 10 | Mungbean | 10.00 | - | - |
| 11 | Urdbean | 12.72 | - | - |
| 12 | Pigeon pea | 105.00 | 12.00 | 307.20 |
| 13 | Sugarcane Setts | 1925.51 | - | - |
| 14 | Sorghum | 3.50 | - | - |
| Total | | 7375.51 | 559.55 | 3083.30 |
| Grand Total | | | | 11018.36 |

4.3.1 New crop varieties

Total five new crop varieties viz. Groundnut (GG 101, GG 24 and GG 42), Pigeonpea (GT 111) and Endorsement of Pearl Millet Hybrid (GHB 1294) of JAU were recommended for release for the benefit of the farmers during the year 2023-24.

Groundnut: Gujarat Groundnut 101 (GG 101: Sorath Keshav)

The farmers of Gujarat state growing groundnut during kharif season are recommended to grow high yielding Spanish bunch groundnut variety Gujarat Groundnut 101 (GG 101: Sorath Keshav). This variety has recorded mean pod yield of 2860 kg/ha, which was 33.96 and 24.26 per cent higher than the check varieties, GJG 9 (2135 kg/ha)

Groundnut: Gujarat Groundnut 24 (GG 24: Sorath Urja)

The farmers of Gujarat state growing groundnut during kharif season are recommended to grow Virginia bunch groundnut variety Gujarat Groundnut 24 (GG 24: Sorath Urja). This variety has recorded mean pod yield of 2555 kg/ha, which was 20.37, 21.97 and 56.42 per cent higher over the check varieties, GJG 22 (2122 kg/ha), GG 20 (2095 kg/ha) and Kaushal (1633 kg/ha), respectively. This variety has also recorded higher kernel yield, oil yield, number of pods per plant and oil content over the check varieties. This variety was found comparable to the check varieties against late leaf spot, rust, stem rot, collar rot diseases and damage due to leaf defoliator.





Groundnut: Gujarat Groundnut 42 (GG 42: Sorath Shaan)

The farmers of Gujarat state growing groundnut during kharif season are recommended to grow Virginia runner groundnut variety Gujarat Groundnut 42 (GG 42: Sorath Shaan). This variety has recorded mean pod yield of 2393 kg/ha, which was 12.51, 27.14 and 50.98 per cent higher over the check varieties, GG 41 (2127 kg/ha), GJG 17 (1883 kg/ha) and Somnath (1585 kg/ha), respectively. This variety has also recorded higher kernel yield, oil yield, number of pods per plant and shelling per cent over the check varieties. This variety was found comparable to the check varieties against late leaf spot, rust, stem rot, collar rot diseases and damage due to leaf defoliator.



Pigeon pea: Gujarat Tur 111 (GT 111: Sorath Ratan)

Farmers of Gujarat state growing pigeon pea are recommended to grow medium maturing (177 days) variety Gujarat Tur 111 (GT 111: Sorath Ratan). It recorded 2197 kg/ha average seed yield, which was 6.6, 18.3, 14.5 and 15.9 per cent higher over check varieties GJP 1, AGT 2, BDN 2 and GT 104, respectively. Seeds of this variety are of cream colour and large in size (12.88 g/100 seeds). This variety is moderately resistant against wilt, resistant against SMD and phytophthora blight diseases, with low pod borer and seed damage due to pod fly.



Pearl millet Hybrid: Gujarat Hybrid Bajra 1294 (GHB 1294: Maru Moti) (Endorsement)

The kharif pearl millet growing farmers of Gujarat state are recommended to grow early maturing hybrid GHB 1294 (Maru Moti). This hybrid recorded average 2717 kg/ha grain yield which was 20.0 % higher than check hybrid GHB-538. It has also recorded average 7306 kg/ha dry fodder yield which was 46.8 % higher than check hybrid GHB-538. The proposed hybrid is resistant against diseases like downy mildew, blast and rust and tolerant against pest like shoot fly, stem borer and heliothis larvae.



4.3.2 Recommendation for Scientific Community

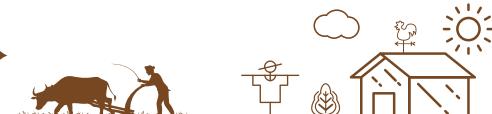
Heat stress mitigation through seed priming in wheat

The farmers of South Saurashtra Agro-climatic Zone growing wheat are recommended to grow variety GW 366 in late sowing condition with seed priming of salicylic acid 50 ppm (Hormonal Priming) (50 ml/l) for 14 hours followed by shade drying recorded the highest grain and biological yield per plant to mitigate heat stress.



4.4 Crop Production

Crop Production group mainly includes Agronomy, Agricultural Chemistry & Soil Science and Weed Control. Recommendations related to nutrient management, cultural practices, irrigation management and weed management are the different aspects of crop production.





Analysis of soil, irrigation water and plant is carried out with well-equipped laboratories at Department of Biotechnology, Agricultural Chemistry and Krishi Vigyan Kendras (KVKs) of JAU at reasonable price and its detail is given below.

Table 4.4.1 Analysis of Soil, Plant and Irrigation Water Sample

| Sr. No. | Detail | No. of Sample analyzed |
|---------|---------------------------|------------------------|
| 1 | Soil sample analysis | 3845 |
| 2 | Irrigation water analysis | 2074 |
| 3 | Plant sample analysis | 1473 |
| | Total | 7392 |

4.4.1 Recommendation for Farmers

4.4.1.1 Nutrient Management

Evaluation of some cow-based bio-enhancers and botanicals for organic cultivation of rabi onion

The farmers of South Saurashtra Agro-climatic Zone growing rabi onion under organic farming are recommended to apply FYM 10 t/ha to obtain higher yield and net realization.

The farmers who are interested in cow-based farming are recommended to apply FYM 5 t/ha along with Panchagavya 3 % spray at 30, 45 and 60 DAS or FYM 5 t/ha along with Jivamrut 500 l/ha with irrigation at sowing, 30 and 45 DAS.



Effect of fresh cow dung on yield and yield attributes of garlic

The farmers of South Saurashtra Agro-climatic Zone growing garlic are recommended to apply slurry (cow dung: water - 1:3) of 1500 kg/ha fresh cow dung (up to 5 days) with irrigation at the time of sowing for getting higher yield, net return and improving soil fertility.



Effect of foliar application of water soluble macro and micro nutrients fertilizers on growth, yield and quality of kharif groundnut

The farmers of South Saurashtra Agro-climatic Zone growing kharif groundnut are recommended to apply RDF 75 % (9.37:18.75:37.50 N: P₂O₅:K₂O kg/ha) + 1.5 % (150 g/10 liter water) WSF (19-19-19-N:P:K) at 45 and 60 DAS + 1.0 % (100 g/10 liter water) Multi-micro Mixture Grade -IV (Zn-6.0 %, Fe-4.0 %, Cu-0.5 %, Mn-1.0 % and B-0.5 %) at 50 and 65 DAS as a foliar spray for obtaining higher yield and net return.



Nutrient management in Bt cotton under rainfed condition (Vallabhipur)

The farmers of Bhal region growing Bt cotton under rainfed condition are recommended to apply 80-40-80-20 kg N-P₂O₅-K₂O-S/ha for obtaining higher yield and net return. The nitrogen should be applied in three splits *i.e.* 25 % as basal at the time of sowing, 50 and 25 % as top dressing at 35-40 and 60-65 days after sowing, respectively by drilling at 10 cm soil depth.





4.4.1.2 Cultural Practices

Multi-tier cropping system to enhance resource utilization, profitability and sustainability of Bt cotton (*Gossypium hirsutum*) production system

The farmers of South Saurashtra Agro-climatic Zone growing Bt cotton are recommended to grow the crop in paired rows (80:160:80 cm) and two rows of groundnut (40 cm distance) OR two rows of soybean (40 cm distance) OR one row of soybean + one row groundnut (40 cm distance) as intercrop between two pairs of Bt cotton for getting higher net return.



Recycling of cotton stalks and its effect on yield and soil health

The farmers of North Saurashtra Agro-climatic Zone growing Bt cotton are recommended to apply Ex-situ composting of cotton stalks using shredder and addition of 10 kg N /ha through urea + compost culture @ 5 kg/ha at the time of sowing along with 80 kg N + 40 kg P₂O₅ + 250 kg gypsum/ha for obtaining higher yield and net return as well as sustaining soil health under rainfed conditions. The nitrogen should be applied in three split i.e. 25 % as basal at the time of sowing, 50 and 25 % as top dressing at 35-40 and 60-65 days after sowing, respectively by drilling at 10 cm soil depth.

OR

Incorporate cotton stalks using mobile chopper and apply one irrigation for decomposing along with 80 kg N + 40 kg P₂O₅ + 250 kg gypsum/ha for obtaining higher yield and net return as well as sustaining soil health under rainfed conditions. The nitrogen should be applied in three split i.e. 25 % as basal at the time of sowing, remaining 50 and 25 % as top dressing at 35-40 and 60-65 days after sowing, respectively by drilling at 10 cm soil depth.



Methodology for preparation of compost from cotton stalks using shredder:

The farmers are advised to recycle of cotton stalk (which are either burned or wasted) by chopping into small pieces of 5-6 cm using cotton shredder and composting with addition of compost culture @ 500 g per tone, urea (N @ 0.5 %), cow dung @ 20 % as well as Azotobactor and PSM @ 500 g each per tone during first turning of cotton stalk to get enriched compost within 120 days having higher content of all plant nutrients.

4.4.2 Recommendation for Scientific Community

Calibration and validation of CERES model (DSSAT 4.6) for different cultivars of wheat under different sowing time

CERES-Wheat model of DSSAT family was calibrated and validated for GW 499, GW 451 and GJW 463 cultivars of wheat.

The model simulations of grain yield of wheat were validated with less than 10 percent error. The genetic coefficients are recommended for use in optimization for crop management and yield prediction of wheat crop as under.





| Symbol | Description | GW 499 | GW 451 | GJW 463 |
|--------------|------------------------------------|--------|--------|---------|
| PHINT | Phyllochron interval (days) | 73.4 | 71.2 | 72.8 |
| P1V | Vernalization coefficient | 0.5 | 0.4 | 0.5 |
| P1D | Photoperiodism coefficient | 1.80 | 1.90 | 2.00 |
| P5 | Grain filling duration coefficient | 3.25 | 3.15 | 3.10 |
| G1 | Kernel number coefficient | 5.55 | 5.60 | 5.50 |
| G2 | Kernel weight coefficient | 4.20 | 4.35 | 4.25 |
| G3 | Spike number coefficient | 5.25 | 5.35 | 5.30 |

DSSAT model can be used for predicting wheat grain yield and phenological events under various agro-climatic conditions. The model may also be used to improve and evaluate the current practices of wheat growth management to increase the crop production.

Calibration and validation of CERES model (DSSAT 4.6) for different cultivars of wheat under different sowing time

It is informed to the scientific community that wheat crop under South Saurashtra Agro-climatic condition can be sown around 15th November (Minimum temperature 15 to 17 °C and Maximum temperature 32 to 34 °C) and prefer varieties GW 499, GW 451 and GJW 463 for getting higher yield and net return.



Dynamics of weed flora in major rabi crops

It is informed to scientific community that information on weed dynamics in wheat, chickpea and coriander during rabi season is as below:

- Total sixteen existing weed species of eleven different families were identified and observed during rabi season. From total sixteen species of

weeds, the families constituted as Amaranthaceae (02), Asteraceae (03), Chenopodiaceae (01), Cyperaceae (01), Euphorbiaceae (01), Leguminosae (01), Liliaceae (01), Poaceae (03), Portulacaceae (01), Solanaceae (01) and Tiliaceae (01).

- Total weeds in floristic composition were *Cyperus rotundus*, *Asphodelus tenuifolius*, *Echinochloa colona*, *Eluropus villosus*, *Dactyloctenium aegyptium*, *Digera arvensis*, *Eclipta alba*, *Euphorbia hirta*, *Parthenium hysterophorus*, *Indigofera glandulosa*, *Portulaca oleracea*, *Corchorus olitorius*, *Tridax procumbens*, *Physalis minima*, *Amaranthus spinosus* and *Chenopodium album*.
- Highest weeds were observed of families; Asteraceae ≥ Poaceae > Amaranthaceae.
- Cyperus rotundus*, *Asphodelus tenuifolius*, *Chenopodium album*, *Echinochloa colona*, *Physalis minima*, *Digera arvensis*, *Eluropus villosus*, *Indigofera glandulosa*, *Eclipta alba* and *Euphorbia hirta* were found to be the most common weed species in rabi season.
- The most dominant succession of *Cyperus rotundus*, *Asphodelus tenuifolius* and *Echinochloa colona* and *Digera arvensis* were noted throughout season.
- Echinochloa colona* with wheat, *Asphodelus tenuifolius*, *Indigofera glandulosa* and *Physalis minima* with chickpea and coriander; *Cyperus rotundus* with all crops throughout rabi season were associated than other weed species.
- Dry weight of weeds increased over time. The lowest weed dry weight was registered in wheat,



followed by coriander and the highest weed dry weight at all the stages was recorded in chickpea.

- Among the crops, monocots > dicots > sedges in wheat, monocots > sedges > dicots were observed in chickpea and coriander. Among weed management practices, monocots > dicots > sedges in unweeded, monocots in weed free, monocots > sedges in HW and monocots > sedges > dicots order in herbicidal treatment was observed.
- The weed late to emerge was observed i.e., *Eluropus villosus* up to 15 DAS.
- Uprooting of weeds at 15 days interval decreased periodical weed dry weight, followed by two hand weeding and application of pre- & post-emergence herbicides. Whereas, the undisturbed weedy condition progressively increased weed dry weight.
- Number of weeds decreased with time. The weed count at all the stages was more or less same in wheat, chickpea and coriander.



Dynamics of weed flora in major *kharif* crops

The scientific community is informed that information on weed dynamics in groundnut, soybean and pearl millet during *kharif* season is as below:

- From total nineteen weeds species, families constituted as Aizoaceae, Amaranthaceae, Asteraceae, Commelinaceae, Cyperaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Lythraceae, Poaceae, Portulacaceae, Solanaceae and Tiliaceae. Highest weeds observed of families; Poaceae > Asteraceae > Euphorbiaceae.
- Total weeds in floristic composition were *Cyperus rotundus*, *Echinochloa colona*, *Eluropus villosus*, *Dactyloctenium aegyptium*, *Digitaria sanguinalis*,

- Removal of existing weeds put forth the emergence of new weeds. HW at 15 & 30 DAS and application of pre- & post-emergence herbicides were almost equally effective in suppressing weed count. Whereas, undisturbed condition reduced weed count over time, but had the highest weed count at all the stages as compared to weed control methods.
- The most densely weeds viz., *Asphodelus tenuifolius*, *Echinochloa colona* and *Cyperus rotundus* and least densely were *Tridax procumbens*, *Chenopodium album* and *Corchorus olitorius*.
- Removal of weeds at 15 days interval increased yields of wheat, chickpea and coriander. Manual weeding and herbicidal weed control were found equally effective in increasing crop yield.
- Weed species vary according to crop and weed management practices.

Digera arvensis, *Eclipta alba*, *Euphorbia hirta*, *Indigofera glandulosa*, *Tridax procumbens*, *Leucas aspera*, *Phyllanthus niruri*, *Corchorus olitorius*, *Commelina benghalensis*, *Portulaca oleracea*, *Ammannia baccifera*, *Parthenium hysterophorus*, *Physalis minima* and *Trianthema portulacastrum*.

- The most dominant succession of *Cyperus rotundus*, *Echinochloa colona*, *Commelina benghalensis*, *Leucas aspera* and *Digera arvensis* were noted throughout season.
- Echinochloa colona* and *Eluropus villosus* with pearl millet, *Indigofera glandulosa* with groundnut and soybean; *Cyperus rotundus* throughout the *kharif* season were associated.

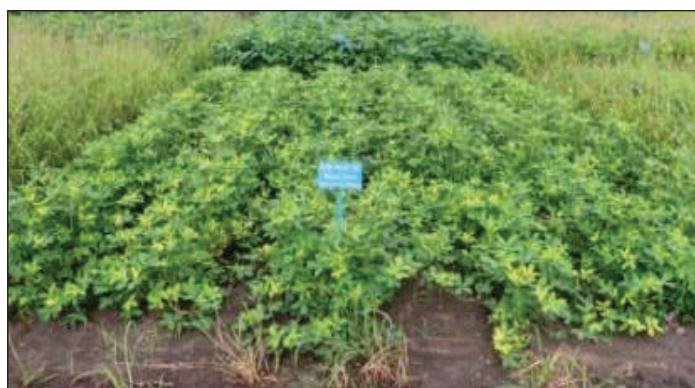
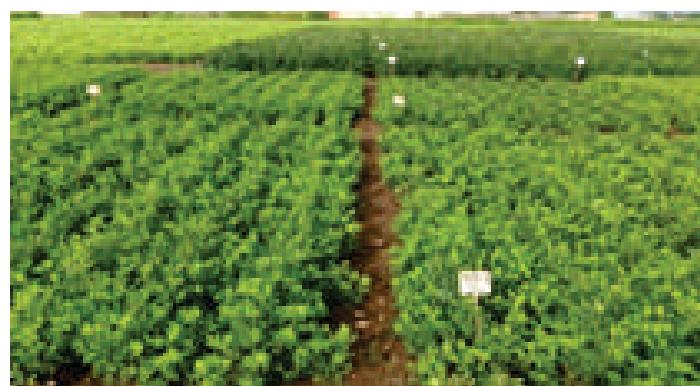


- Among the crops, monocots > dicots > sedges in pearl millet, dicots > sedges > monocots were observed in soybean and groundnut. Among weed management practices, dicots > monocots > sedges in unweeded, monocots in weed free and HW and monocots > sedges > dicots order in herbicidal treatment was observed.
- The herbicidal treatments have lowest monocot weeds up to 30 DAS.
- Dry weight of weeds increased over time. Uprooting of weeds at 15 days interval decreased periodical weed dry weight, followed by hand weeding and herbicidal treatments. Whereas, the undisturbed weedy condition progressively increased weed dry weight.
- Number of weeds decreased with time. Weed species vary according periodical stages, crops and weed management practices.
- The most densely weeds viz., *Echinochloa colona* and *Cyperus rotundus* and least densely were *Tridax procumbens*, *Parthenium hysterophorus* and *Trianthema portulacastrum*.
- The weeds late to emerge were *Digitaria sanguinalis* up to 15 DAS, *Eluropus villosus* up to 30 DAS and *Ammannia baccifera* up to 45 DAS.
- Removal of existing weeds put forth the emergence of new weeds specially weed i.e., *Ammannia baccifera* and *Cyperus rotundus*.
- *Ammannia baccifera* found dominating around 45 DAS in weed free condition when the rainfall amount was more.
- The *Phyllanthus niruri* dominant only in earlier season, hence it has completed life cycle within 30-45 DAS.



Effect of plant growth retardants on growth, yield attributes and yield of kharif groundnut

It is informed to the scientific community that in *kharif* groundnut foliar application of Chlormequate Chloride 1000 ppm at 45 and 60 DAS gave higher groundnut pod and haulm yield.





Evaluation of soil texture of Junagadh district

It is informed to scientific community that, soil texture of Junagadh district is clayey, consisting of soil separate *viz.* sand 29.05 %, silt 24.67 % and clay 46.23 % i.e. 64 % area of soils of Junagadh district. Among the different talukas, Malia, Mangrol and Visavadar talukas soils falls under clay loam texture, while, in Vanthali, Bhesan, Keshod, Manavadar, Mendarda and Junagadh talukas soils falls under clayey texture.



Effect of FYM with and without phosphorus on groundnut (GG 20) yield

It is informed to scientific community that in *kharif* groundnut application of FYM 10 t ha⁻¹ along with 20 kg P₂O₅ ha⁻¹ every year gave higher yield and net return and also increases phosphorus content and uptake by pod and haulm. Application of FYM 10 t ha⁻¹ along with 20 kg P₂O₅ ha⁻¹ every year also increasing the phosphorus level in soil as compared to control.

Screening of sesame varieties/germplasm lines for yield performance under organic condition in *kharif* season

The scientific community is informed that under Saurashtra region of Gujarat sesame varieties/germplasm lines G.Til 4, G. Til 10, AT 375, GJT 5, AT 371, AT 314, G.Til 3 and AT 377 gave high seed yield in *kharif* season under organic condition.

Table 4.5.1 Production of 'Gir Sawaj' brand bio-agent and liquid bio-fertilizer

| Sr. No | Name of Product | Quantity |
|--------|--------------------------------------|----------|
| 1 | <i>Gir Sawaj-Trichoderma</i> (kg) | 2176 |
| 2 | <i>Gir Sawaj-Rhizobium</i> (liter) | 674 |
| 3 | <i>Gir Sawaj-Azotobacter</i> (liter) | 413 |
| 4 | <i>Gir Sawaj-PSB</i> (liter) | 893 |
| 5 | <i>Gir Sawaj-KMB</i> (liter) | 153 |

Department of Entomology has produced various microbial agents under the trade name "*Gir Sawaj*" e.g. viruses, bacteria, fungi, protozoa and nematodes are being used in IPM program as shown in below table. Among viral pathogens, nuclear polyhedrosis viruses of *Helicoverpa* (HNPV),

4.5 Plant Protection

The research work carried out by plant protection group is to develop the economically viable technology for increasing production of agricultural commodities without any adverse effect on the environment and livelihood of the people. Plant protection mainly includes two groups i.e. Entomology and Plant Pathology.

During the year 2023-24, Department of Plant Pathology has produced and distributed bio-agents under the trade name "*Gir Sawaj*" as shown in table below. Department also produced and distributed products like *Rhizobium*, *Azotobacter* and PSB liquid bio-fertilizer to farmers, State Departments, other Govt. bodies etc. at reasonable price.

Spodoptera (SNPV), entomopathogenic fungi *Beauveria bassiana*, fruit fly trap, fruit fly lure, pheromone trap, pheromone lure are widely used for insect control. These pathogens are highly specific to their host and being considered environmentally safe.



Table 4.5.2 Production of 'Gir Sawaj' brand microbial agents, traps, lure etc.

| Sr. No. | Name of Product | Quantity |
|---------|--|----------|
| 1 | Gir Sawaj <i>Beauveria</i> (Kg) | 747 |
| 2 | Gir Sawaj <i>Metarhizium</i> (Kg) | 2,567 |
| 3 | Gir Sawaj HNPV (litre) | 142 |
| 4 | Gir Sawaj SNPV (litre) | 71 |
| 5 | Gir Sawaj Trichocard (No.) | 604 |
| 6 | Gir Sawaj Fruit fly trap (No.) | 11,566 |
| 7 | Gir Sawaj Fruit fly lure for fruit crops (Nos.) | 17,828 |
| 8 | Gir Sawaj Fruit fly lure for vegetable crops (Nos.) | 2135 |
| 9 | Gir Sawaj Pheromone trap (No.) | 8919 |
| 10 | Gir Sawaj Pheromone Lure (Pink bollworm) (Nos.) | 13,476 |
| 11 | Gir Sawaj Pheromone Lure (<i>Helicoverpa</i>) (Nos.) | 2,728 |
| 12 | Gir Sawaj Pheromone Lure (<i>Spodoptera</i>) (Nos.) | 624 |
| 13 | Gir Sawaj Pheromone Lure (Brinjal shoot and fruit borer) (Nos.) | 37 |
| 14 | Gir Sawaj MDP Technology for Pink bollworm (100 gm Tube) | 08 |
| 15 | Gir Sawaj MDP Technology for Brinjal shoot and fruit borer (100 gm Tube) | 37 |
| 16 | Gir Sawaj Chrysopa eggs (1 bottle =1000 eggs) | 1,114 |
| 17 | Gir Sawaj Honey (500 gm bottle) | 244 |

4.5.1 Recommendation for Farmers

4.5.1.1 Entomology

Effect of different poison baits against fall army worm *Spodoptera frugiperda* (J. E. Smith) infesting maize

The farmers of Gujarat growing maize are

recommended to apply poison baits of thiodicarb 75 WP 250 g or emamectin benzoate 5 SG 100 g mixed with 5 kg jaggery and 25 kg maize flour in 8 litre of water/ha in whorl of plants, first at the initiation of pest infestation and second application at 20 days after first application for effective management of fall armyworm.





CIB & RC format

| Year | Crop | Pest | Pesticides/ Biopesticides with formulation | Dosage | | Application schedule |
|------|-------|--------------------------------------|---|---|--|--|
| | | | | Quantity of formulation g or ml/kg seed, kg or l/ha | | |
| 2024 | Maize | <i>Fall armyworm, S. Frugi-perda</i> | Thiodicarb 75 WP | 250 g | | First application at initiation of pest infestation, second application at 20 days after first application |
| | | | Emamectin benzoate 5 SG | 100 g | | |

Standardization of number of pheromone traps for management of mango fruit fly, *Bactrocera dorsalis* (Hendel)

The farmers of South Saurashtra having mango orchards are recommended to install 30 methyl eugenol parapheromone traps per hectare at pea sized fruit stage and three meter height from ground level for effective management of fruit fly and the lure to be changed three times at an interval of 40 days.



4.5.1.2 Plant Pathology

Evaluation of ready-mix fungicides as a seed treatment against soil borne diseases of groundnut

Farmers of Gujarat growing *kharif* groundnut are recommended to apply seed treatment with carboxin

37.5 + thiram 37.5 WS @ 3 g/kg seed or carbendazim 25 + mancozeb 50 WS @ 3 g/kg seed or penflufen 13.28 + trifloxystrobin 13.28 FS @ 3 ml/kg seed as ready-mix fungicide for effective management of aflatrot, collar rot and stem rot in groundnut.



**CIB & RC format**

| Year | Crop | Pest | Pesticides/ Biopesticides with formulation | Dosage | Application schedule | Remark(s) |
|------|-----------|--|--|--|---|---|
| | | | | Quantity of formulation g or ml/kg seed, kg or l/ha | | |
| 2024 | Groundnut | Aflarot, collar rot, stem rot | Carboxin 37.5 + Thiram 37.5 WS | 3 g | Seed treatment per kg at the time of sowing | These pesticides are registered with CIB & RC for use in ground nut crop for management of this disease. |
| | | | Carbendazim 25 + Mancozeb 50 WS | 3 g | | |
| | | | Penflufen 13.28 + Trifloxystrobin 13.28 FS | 3 ml | | |

4.5.2 Recommendation for Scientific Community**4.5.2.1 Entomology****Effect of different poison baits against fall army worm *Spodoptera frugiperda* (J. E. Smith) infesting maize**

Two applications of poison baits in whorl of plants containing indoxacarb 15.8 EC 125 ml, 5 kg jaggery and 25 kg maize flour in 8 L of water/ha, first at the initiation of pest infestation and second application at 20 days after first application found effective against fall armyworm infesting maize.

**Standardization of number of pheromone traps for pink bollworm, *Pectinophora gossypiella* (Saunders) in cotton**

Installation of 50 sex pheromone traps per hectare at crop canopy level after 40 days of sowing for effective management of cotton pink bollworm and the lure to be changed three times at an interval of 40 days.

**Effect of biorationals against aphid, *Lipaphis erysimi* (Kalt.) infesting mustard**

Apply two sprays of *Beauveria bassiana* 1.15 WP (1×10^8 cfu/g) at 0.007 % (60 g/10 L of water) or neem oil (10000 ppm) at 0.004 % (40 ml/10 L of water) first spray when pest cross ETL level (1.5 aphid index/plant) and second spray at 10 days after first spray for effective management of mustard aphid.





Effect of date of sowing and acaricides against yellow mite, *Polyphagotarsonemus latus* (Banks) infesting cluster bean

Sowing of cluster bean crop during fourth week of February and two sprays of diafenthuron 50 WP 0.05 % (10 g/10 lit of water) or fenpyroximate 5 EC 0.005 % (10 ml /10 lit of water), first spray at initiation of the pest and second at 20 days after first spray found effective against mobile stage of yellow mite, *Polyphagotarsonemus latus* (Banks) infesting cluster bean.



Evaluation of different insecticides against thrips in groundnut

Two sprays of spinetoram 11.7 SC 0.012 % (10 ml/10 L of water) or spinosad 45 SC 0.014 % (3 ml/10 L of water) or cyantraniliprole 10.26 OD 0.010 % (10 ml/10 L of water), first spray at the initiation of pest infestation and second at 10 days after first spray for the management of thrips in groundnut.



Bio-efficacy of ready-mix insecticides against capsule borer, *Dichocrosis punctiferalis* infesting castor

Two sprays of chlorantraniliprole 10 + lambda cyhalothrin 5 ZC (4 ml/10 L of water) or novaluron 5.25

+ emamectin benzoate 0.9 SC (15 ml/10 L of water) or novaluron 5.25 + indoxacarb 4.5 SC (16 ml/10 L of water) first spray at the initiation of pest infestation and second at 15 days after first spray for the management of castor capsule borer.



4.5.2.2 Plant Pathology

Integrated management practices to minimize *Aspergillus flavus* infection in groundnut

Seed treatment with mancozeb 75 WP 3 g/kg of seed + chlorpyriphos 20 EC 25 ml/kg of seed at the time of sowing + furrow

application of *Trichoderma harzianum* 1.00 % WP (2×10^6 cfu/g min.) 2.5 kg in 500 kg of FYM/ha at the time of sowing + soil drenching of chlorpyriphos 20 EC 5 ml/lit of water at 30 and 60 days after sowing to reduce the aflarot infection in groundnut.



Management of pearl millet blast (*Pyricularia grisea*) disease

Two sprays of azoxystrobin 11 + tebuconazole 18.30 SC 0.05 % (17.00 ml/10 L of water) or tebuconazole 50 + trifloxystrobin 25 WG 0.05 % (6.50 g/10 L of water) first at initiation of disease and second spray after 15 days of first spray for the management of blast disease in pearl millet.



Management of pearl millet blast by using chemical and bio agents

Spray of *Pseudomonas fluorescens* 1.00 WP 1×10^8 cfu/g min. (100 g/10 L of water) at 20 days after sowing (DAS) and second spray of tebuconazole 50 + trifloxystrobin 25 WG 0.04 % (5.33 g/10 L of water) at 35 DAS or two sprays of tebuconazole 50 + trifloxystrobin 25 WG 0.04 % (5.33 g/10 L of water) at 20 and 35 DAS for the management of blast disease in pearl millet.

Effect of different fungicides for the management of blight and powdery mildew in fennel

Three sprays of azoxystrobin 11 + tebuconazole 18.30 SC 0.044 % (15 ml/ 10 L water) or metiram 55 + pyraclostrobin 5 WP 0.18 % (30 g/10 L water) or tebuconazole 50 + trifloxystrobin 25 WG 0.045 % (6 g/10 L water) first spray at initiation of disease and subsequent two sprays at an interval of 20 days for the management of *Alternaria* blight of fennel.



4.6 Horticulture and Forestry

Horticulture and Forestry carry out the research on fruits science, vegetables science, post-harvest technology of fruits & vegetables, floriculture & Landscape Architecture and research on spices. This also includes the development of new fruit and vegetable crop varieties.

Planting material of fruit crops, seedling and Ornamentals & Medicinal plants are provided to the farmers and stake holders at dispatching centre of Junagadh, Mangrol and Mahuva as per below table



Table 4.6.1 Production of planting material of horticultural and other crops

| Sr. No. | Planting Material | Production (Nos.) |
|---------|--------------------------------|-------------------|
| 1 | Fruit crop graft | 18386 |
| 2 | Fruit crops saplings | 44082 |
| 3 | Seedlings | 34527 |
| 4 | Ornamentals & Medicinal plants | 50858 |
| | Total | 147853 |

4.6.1 Recommendation for Farmers.

Response of different rootstocks under saline irrigation condition in tomato

The farmers of South Saurashtra Agro-climatic Zone growing tomatoes are recommended to use var. GT-6 grafted on Arka Vikas with use of saline irrigation water up to 2.0 dS/m EC for higher yield and net return.



Nutrient management in tomato under polyhouse

The farmers of Gujarat growing tomato under polyhouse are recommended to apply RDF (25.0-12.5-12.5 N-P₂O₅-K₂O kg/ 1000 m²) + *Panchgavaya* 3 % (3 spray at 45, 60 and 75 days after transplanting) to obtain higher yield and net return.



Propagation of a rare and medicinally important declining shrub species Agnimantha (*Premna serratifolia* L.) by hardwood cuttings

The nurserymen of Gujarat are recommended to use plant growth regulator either IBA @ 450 ppm (73.33 % sprouting) or IAA @ 450 ppm (70.67 % sprouting) [i.e. 450 mg in one litre water] for 15 minutes dipping for better propagation in hardwood cuttings of Agnimantha (*Premna serratifolia* L.).



4.7 Agricultural Engineering

The Agricultural Engineering group accomplished the studies on design, development & fabrication of

agricultural machinery, equipment, tools, sources of renewable energy, processing of agricultural goods and conservation of water etc.

The “Testing and Training Center of Farm Machinery” under the Department of Farm Machinery and Power, CAET, JAU, Junagadh was established in August, 2008 by the State Govt. with the financial support from the Central Govt. under Rashtriya Krishi Vikas Yojna (RKVY). It is on the line of testing of agricultural machines carried out by Farm Machinery Testing and Training Institutes (FMTTIs), established by the Govt. of India. This Center is one of the twenty five institutions approved by the Department of Agriculture & Co-operations, Ministry of Agriculture, GoI in the direction of ensuring supply of quality agricultural machinery and equipment under Government programs. Various types of equipments produced by the manufacturer of the state and national level have been received for evaluation of their work performance and feasibility.

Table 4.7.1: No. of Farm Machineries/ Implements/ equipments (category wise) tested at testing centre of FMPE, CAET

| Category | Name of Equipment / Machine | No. of Equipment / Machine Tested |
|--------------|---|-----------------------------------|
| A | Land development, tillage & seedbed preparation equipment | 60 |
| B | Sowing and planting equipment | 12 |
| C | Intercultivation equipment | 0 |
| D | Plant protection equipment | 10 |
| E | Harvesting and threshing equipment | 26 |
| F | Equipment for residue management | 11 |
| G | Post-harvest and agro processing equipment | 01 |
| Total | | 120 |

4.7.1 Recommendation for Farmers

Yield response of drip fertigation for wheat-green gram crop sequence

The farmers of South Saurashtra Agro-climatic Zone growing wheat are recommended to apply 75 % of NPK of RDF (120 N:60 P₂O₅:60 K₂O kg/ha) through drip fertigation only (with no basal doze) adopting the following drip system and irrigation schedules to wheat crop in 8 equal splits at 6 days interval after 12 days of sowing to get higher grain yield and net return.





| Specifications of drip irrigation system and its operating time for wheat crop | | | | |
|---|--|--------------------|-----------------------|----------------------------|
| Drip irrigation system details | Nos. and depth of irrigation and drip irrigation system operating time for wheat crop during winter season | | | |
| | DAS | No. of irrigations | Irrigation depth (mm) | Operating time/ irrigation |
| Lateral type =Inline Inline drip size =16 mm (OD) Dripper rate 4 =lph Dripper spacing =0.5 m Lateral spacing =0.675 m Nos. of crop rows per drip line =3 | 0 | 1 | 40 | 3 h & 23 Minutes |
| | 0-10 | 1 | 30 | 2 h & 32 Minutes |
| | 10-40 | 5 | 20 | 1 h & 41 Minutes |
| | 41-70 | 5 | 22 | 1 h & 51 Minutes |
| | 71-90 | 3 | 24 | 2 h |
| | > 90 | 2 | 26 | 2 h & 12 Minutes |

It is also recommended to sow green gram crop in paired row (0.3 m x 0.375 m) after harvesting of wheat crop without any cultivation operation and to apply 75 % P of RDF (20 N:40 P₂O₅:00 K₂O kg/ha) as basal dose

and 75 % N of RDF through drip fertigation adopting the following drip system and irrigation schedules in 5 equal splits at 6 days interval after 12 days of sowing to get higher seed yield and net return.

| Specifications of drip irrigation system and its operating time for green gram crop | | | | |
|---|---|--------------------|-----------------------|----------------------------|
| Drip irrigation system details | Nos. and depth of irrigation and drip irrigation system operating time for green gram crop during summer season | | | |
| | DAS | No. of irrigations | Irrigation depth (mm) | Operating time/ irrigation |
| Lateral type =Inline Inline drip size =16 mm (OD) Dripper rate 4 =lph Dripper spacing =0.5 m Lateral spacing =0.675 m Nos. of crop rows per drip line =2 | 0 | 1 | 20 | 1 h & 41 Minutes |
| | 0-10 | 1 | 15 | 1 h & 16 Minutes |
| | 11-30 | 5 | 21 | 1 h & 46 Minutes |
| | 31-70 | 6 | 23 | 1 h & 56 Minutes |
| | >70 | 1 | 22 | 1 h & 51 Minutes |

In-situ soil moisture conservation: utilization and management of rainwater for groundnut production

The farmers of North Saurashtra Agro-climatic Zone are recommended to grow groundnut by sowing on tied ridge with plot bunding and apply agricultural waste (Groundnut shells @ 1.5 t/ha) as mulch to conserve moisture and obtaining maximum rain water use efficiency, higher productivity and net returns under dry farming conditions.



Design, development and performance evaluation of battery operated light weight interculture tool/weeder

Farmers and manufacturers are recommended to use the JAU developed battery operated (easily operated by one person) intercultural tool /weeder (having rotary type blades, operated by 0.5 hp DC motor and 12-V 74-Ah, rechargeable battery) for vegetable/horticultural crops for interculturing / weeding operation. The working width of weeder is 30 cm with field capacity 0.02-0.03 ha/h and 84 to 90 % weeding efficiency. There is a saving of up to 85 % in time, 35 % in energy and 78 % in cost of operation.



Development and performance evaluation of mini tractor operated multi crop weeder

Farmers are recommended to use “Mini Tractor Operated Multi Crop Sweep Blades Weeder” developed by Junagadh Agricultural University for better performance in weeding, time and cost saving in place of existing blade harrow.



Development and performance evaluation of mini tractor operated weed inverting roller

Farmers are recommended to use “Mini Tractor Operated Weeder with weed inverting roller” developed by Junagadh Agricultural University for better performance in weeding, weed inverting and time saving in place of existing blade harrow.

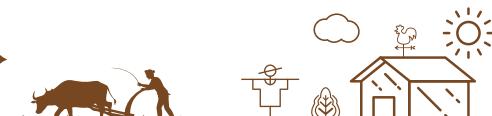


Standardization of process parameters for sesame spread preparation

The manufacturers of sesame spread are recommended to adopt the process technology developed by Junagadh Agricultural University for the production of good quality sesame spread. The recommended procedure involves roasting of dehulled sesame seeds at 147 °C for 27 minutes 30 second. Subsequently, the cool roasted dehulled sesame seeds are blended and grinded with jaggery (9.50 %), hydrogenated vegetable oil (6.20 %), guar gum powder (1.3 %) and salt (1.0 %). Following this process protocol leads to sesame spread with optimal quality attributes.



The manufacturers of sesame spread are recommended to store sesame spread in PET (Polyethylene Terephthalate) containers under refrigerated conditions (8°C) to ensure safety storage up to three months. This storage protocol developed by



Junagadh Agricultural University maintains superior biochemical, rheological and sensory quality along with oxidative and microbial stability of the sesame spread throughout the three month storage period.

Development of solar tunnel dryer for local spices

The farmers and processors involved with drying of spices, viz., fresh red chilies, turmeric and ginger are recommended to use the solar tunnel dryer developed by Junagadh Agricultural University to reduce the drying time, drying space, minimize post-harvest losses during drying and handling, better quality, more recovery as well as higher economic returns of their dried spices as compared to traditional sun drying method.



- Quantity of spices in the dryer: 500 ± 5 kg (Red chilies), 540 ± 5 kg (Turmeric), 525 ± 5 kg (Ginger) per batch
- Drying time: 14 days (red chilies), 22 days (turmeric), 23 days (ginger) (during January-April).

Development of solar tunnel dryer for local spices

The farmers and processors involved with drying of spices are recommended to use the solar tunnel dryer developed by Junagadh Agricultural University for drying spices to a safe moisture level as per following details.



- Details of solar tunnel dryer:
- Capacity of dryer: 500 ± 5 kg to 540 ± 5 kg depends on spices to be dried.
- Drying trays: 64 trays arranged in two tiers.
- Maximum drying air temperature: $53^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

- Maximum increment in drying temperature: 25.9°C (winter) and 28.8°C (summer).
- Solar collectors (Optional): 3 Nos. ($1.22 \text{ m} \times 2.44 \text{ m}$).

Gasification of Castor and pigeon pea crop residues for combined gaseous and bio-char production

The farmers and entrepreneurs are recommended to use shredded castor and pigeon pea stalks as feed stalks in an open-core downdraft gasifier system developed by Junagadh Agricultural University. The maximum gasification efficiency of 71.44 % & 73.28 % and biochar production of 21.56 % & 21.78 % having the fixed carbon content of 59.61 % and 49.22 % could be achieved from castor and pigeon pea stalk respectively at $22 \text{ m}^3/\text{h}$ gas flow rate. The carbon footprint (CF) of biochar is a net reduction of 1.67 tons of CO_2 per ton of feedstock.

Performance of field crops and shade resistance vegetable crops under the Agrivoltaic System

Farmers of Gujarat state are recommended to use J.A.U model of Agrivoltaic system for electricity generation along with the cultivation of field crops like; Cotton, Groundnut and Cucumber to get additional income on the same land throughout the year.

4.7.2 Recommendation for Scientific Community

River flow simulations integrating satellite data in a forested catchment

In assessing the spatial soil wetness condition of a catchment, microwave remote sensing proves to be an invaluable tool. However, it is advised the scientific community to exercise caution when applying scatterometer data for estimating river water levels in forested catchments. The presence of a dense forest canopy can lead to reduced radar backscatter, potentially affecting the accuracy of the estimates.

River flow simulations integrating satellite data in a forested catchment

It is recommended to use the following power function relationship as a tool for estimating downstream discharge (outlet discharge) based on water level measurements. $Y = a \cdot X^b$ Where, $a = 0.7501$, $b = 2.4511$, $X = \text{river water level, meter}$ and $Y = \text{discharge in cumec}$

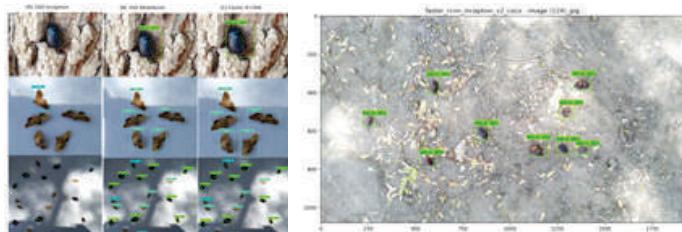




This equation offers invaluable assistance to forest planners in effectively managing available water resources. By employing this relationship, planners can make informed decisions, ensuring sustainable and efficient water allocation within forested regions, thereby contributing to sound environmental stewardship and resource conservation.

Detection and Classification of the major Nocturnal flying Insects using Deep Learning

It is recommended to use Convolutional Neural Network (CNN)'s meta-architecture Faster Region-Convolutional Neural Network (Faster R-CNN) for the detection and classification through digital view of major nocturnal flying insects for better performance. In the case of addressing class imbalance issues, an augmentation technique with Faster R-CNN is recommended.



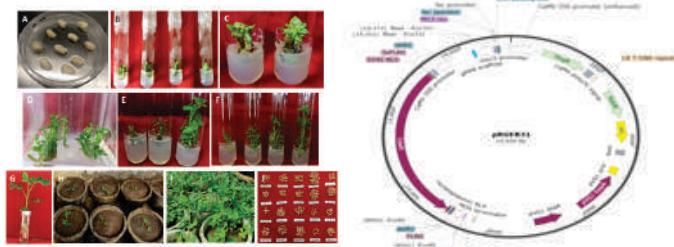
4.8 Basic Science

Basic Science group works on the areas of plant Biochemistry & Biotechnology, Plant Physiology and Plant molecular Biology. It includes research on Genetic manipulation of crops for stress resistance, molecular biology and genetic engineering work in plant sciences.

4.8.1 Recommendation for Scientific Community

Improvement of Groundnut oil quality for high oleic acid through CRISPR/Cas gene editing technology

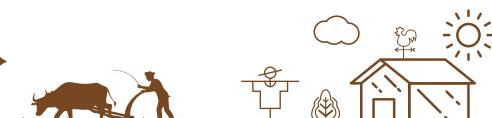
The scientific community involved in groundnut improvement through genome editing technology is recommended to use the optimized tissue culture protocol using de-embryonated cotyledone as explants (multiple shoot formation: MS + 25.0 mg/l 6-benzylaminopurine, shoot elongation: MS + 3.0 mg/l 6-benzylaminopurine, + 1.0 mg/l gibberellic acid, root induction: MS + 1.0 mg/l naphthalene acetic acid), CRISPR/Cas9 technology and binary vector for successfully editing the gene of interest (*AhFAD2B*) in groundnut for achieving high O/L ratio (8.52). A single guide RNA sequence (5'TGTGGTCTATGATCTGT-TAATGG3'), designed by using CHOPCHOP, was utilized to guide the Cas nuclease for precise editing.



4.9 Social Science

Social Science group works on the areas of Agricultural Economics, Agricultural Extension Education, Agricultural Statistics, Agribusiness Management and Home Science.

Agricultural economists worked on different research projects viz. i) Farm cost studies of important crops in Gujarat state; ii) Changing Cost Structure and Total Factor Productivity Growth of Onion in Gujarat; iii) Credit flow and its utilization behavior among farmers in Saurashtra region, Gujarat; iv) Price forecasting for selected crops; v) Performance and Determinants of Plant Varietal Protection (PVP) Legislation in Indian Agriculture with Special Reference to Gujarat; vi) India's balance of trade in agriculture with SAARC nations: An econometric analysis and vii) The scheme for creating a permanent





machinery for studying the cost of cultivation/production of principal crops grown in Gujarat. The price forecast reports of groundnut and cotton were prepared and disseminated in October-November, 2023 at harvesting season, which published in 7 clippings of leading Gujarati News Papers on different dates. This benefits the farmers to take decisions regarding, storage or to sale at current prices.

Various research projects are running by Post Graduate Institute of Agribusiness Management Institute, JAU, Junagadh, which includes: i) Effect of micro irrigation system on livelihood in Saurashtra region; ii) Value chain analysis of Kesar mango in Saurashtra region; iii) Social media usage and academic performance of students of Junagadh Agricultural University; and iv) Export cost estimation and mileage of major commodities of Saurashtra.

4.9.1 Recommendation for Scientific Community

Changing Cost Structure and Total Factor Productivity Growth of Onion in Gujarat

It is suggested to the policymakers that since the onion yield growth rate during the last three decades in Gujarat could not outpace the growth in labour, seed and plant protection costs, the negative growth in total factor productivity (TFP) and higher growth of real cost of production (RCP) over farm harvest prices (FHP) need to be countered with the promotion of large-scale mechanisation in farm operations, proper management of agronomical practices and optimal seed rate.

Performance and determinants of Plant Varietal Protection (PVP) behaviour in Indian agriculture with special reference to Gujarat

It is recommended that targeted sensitization drives through training and workshops be scaled up to increase the grassroots awareness of PPVFRA and enhance the registration of farmers' varieties. In addition, it is also recommended for promoting location-specific hand-holding sessions for filing the applications of farmers to address the imbalances in crop-wise and region-wise registrations. Both public and private agencies should also be encouraged to share their infrastructure and technical knowledge, leading to the enhanced prospects of registration and commercialization of improved varieties/hybrid cultivars.

Hectarage Prediction Models for Major Oilseed crops of Gujarat: An Empirical Investigation

It is recommended to the scientific community that area under selected crops can be precisely predicted using the single equation models rather than simultaneous equation models as single equation model gives maximum R^2 and \bar{R}^2 with low values of MAPE, RMSE and MAE.

Development of Statistical Analysis Programme using Python Machine Learning and Data Visualization

The scientists/researchers of SAUs are recommended to use new computer programs developed by the Junagadh Agricultural University which are requirement specific, unique, user friendly with the important features of descriptive auto conclusion and auto data visualization for Individual, pooled, control vs rest CRD, RBD, FCRD and FRBD analysis respectively, simple linear, multiple linear and polynomial regression as well as one, two and pair sample T tests. It is also recommended to JAU to develop & design open source user interface, so SAUs of the Gujarat can be used these computer programs without any charges.

Farmers' adoption of cotton production technologies recommended by JAU, Junagadh

The extension functionaries are advised to conduct training programmes, field demonstrations and exhibitions of pest and disease samples for cotton growing farmers in line with the recommended cotton production technologies of Junagadh Agricultural University to ensure their maximum adoption by farmers.

Value chain analysis of Kesar mango in Saurashtra region

Stakeholders and policymakers involved in the Kesar mango value chain in the Saurashtra region are advised to strengthen crop management system, develop post-harvest infrastructure and improve post-harvest operations to maintain better quality of Kesar mango for the remunerative farming and consumer satisfaction.





Effect of micro irrigation system on livelihood in Saurashtra region

Extension functionaries are recommended to advise farmers of the Saurashtra region to adopt and use micro irrigation system in their farm to reduce their poverty level and increase the financial and overall livelihood.

4.10 Transfer of Technology

4.10.1 Front Line Demonstration (FLD) conducted on farmers' field

Crop scientists of JAU have successfully conducted Front Line Demonstrations (FLDs) of newly developed varieties and production technologies on farmers' fields for speedy propagation among the farmers.

Table 4.10.1: Summary of FLDs of Improved Varieties

| Sr. No. | Crop | Improved variety | No. of FLDs | Total area under FLD (ha) | Yield in IP (q/ha) | Yield in FP (q/ha) | Increase in yield (%) |
|---------|-----------------------|------------------|-------------|---------------------------|--------------------|--------------------|-----------------------|
| 1 | Sesame (Summer) | GJT 5 | 20 | 8 | 8.07 | 7.46 | 8.12 |
| 2 | Sesame (Kharif) | G.Til 6 | 13 | 5.2 | 7.64 | 6.67 | 14.45 |
| 3 | Cotton | GADC-3 | 10 | 4.0 | 4.891 | 4.389 | 11.44 |
| 4 | Castor | GCH 9 | 32 | 12.8 | 40.71 | 36.39 | 17.10 |
| 5 | Pearl millet (Summer) | GHB 1129 | 50 | 20 | 39.59 | 37.12 | 6.67 |
| 6 | Pearl Millet (Kharif) | GHB 1129 | 12 | 4.8 | 27.91 | 25.28 | 10.40 |
| 7 | Pigeon pea | GJP-1 | 15 | 13.0 | 17.68 | 14.72 | 20 |
| 8 | Chickpea | GG 7 | 4 | 2.0 | 22.60 | 18.70 | 21 |
| | | GG 8 | 5 | 2.5 | 25.44 | 21.20 | 20 |
| | | GKG 1 | 1 | 0.5 | 24.00 | 19.00 | 26 |
| | | GJG 6 | 15 | 6.0 | 16.46 | 14.76 | 11.55 |
| 9 | Coriander | G. Cr.-4 | 18 | 0.4 | 17.56 | 12.39 | 41.68 |
| | | G. Cr.-3 | 21 | 0.4 | 12.86 | 11.59 | 10.95 |
| 10 | Cumin | Gujarat Cumin-4 | 17 | 0.4 | 6.06 | 5.12 | 18.41 |
| 11 | Fenugreek | G. Fenugreek-2 | 04 | 0.4 | 17.39 | 14.40 | 20.75 |
| 12 | Fennel | G. Fennel-12 | 02 | 0.4 | 18.05 | 14.17 | 27.34 |
| 13 | Ajwain | Gujarat Ajwain-2 | 01 | 0.4 | 7.10 | 5.95 | 19.33 |
| 14 | Onion (Kharif) | Bhima Supar | 05 | 0.4 | 328.30 | 294.70 | 11.40 |
| 15 | Onion (Rabi) | GJRO-11 | 20 | 0.4 | 356.55 | 292.93 | 21.72 |
| 16 | Garlic | GJG-5 | 07 | 0.4 | 69.38 | 59.67 | 16.27 |





Table 4.10.2: Summary of FLDs of Improved Technology

| Sr. No. | Crop / other | Production technology | No. of FLDs | Total area under FLD (ha) | Yield in IP (q/ha) | Yield in FP (q/ha) | Increase in yield (%) |
|---------|--------------------|------------------------------------|-------------|---------------------------|--------------------|--------------------|-----------------------|
| 1 | Sesame (Summer) | Plant protection | 5 | 2.0 | 7.51 | 7.16 | 4.83 |
| | | Fertilizer management | 5 | 2.0 | 8.15 | 7.61 | 7.15 |
| 2 | Sesame (Kharif) | Whole package | 4 | 1.6 | 8.18 | 6.67 | 22.68 |
| | | Intercropping | 1 | 0.4 | 8.38 | 6.42 | 30.53 |
| | | Fertilizer management | 4 | 1.6 | 7.87 | 7.24 | 8.78 |
| | | Plant protection | 3 | 1.2 | 6.67 | 6.26 | 6.61 |
| 3 | Cotton | IPM/ INM and Canopy mgmt. | 62 | 30 | 22.72 | 21.22 | 6.60 |
| | | High Density Planting | 10 | 4.0 | 5.81 | 5.18 | 12.22 |
| | | Pest and disease management | 10 | 4.0 | 5.55 | 4.98 | 11.51 |
| 4 | Wheat | Nutrient management | 10 | 4.0 | 33.40 | 29.80 | 12.07 |
| 5 | Cumin | Pest and disease management | 10 | 4.0 | 4.81 | 4.27 | 12.70 |
| 6 | Groundnut (Summer) | Whole package | 19 | 7.60 | 22.42 | 21.02 | 6.63 |
| 7 | Castor | Intercropping - Castor + Groundnut | 10 | 4.0 | 59.33 | 26.92 | 135.9 |

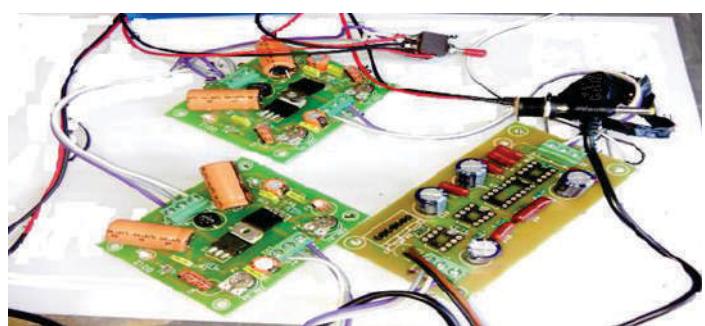
Note: 1. Improved technology includes crop production, plant protection and basic science.

2. Yield of inter cropping is the main crop (as shown in column-2) equivalent yield.

4.11 Others

4.11.1 Intellectual Property Rights (IPR)

University has developed different technologies in various fields of agriculture, agricultural engineering. To protect these technologies, University has filed these inventions under various categories of IPR, *i.e.*, Patent, Design *etc.* The details of patented technologies under IPR Act are given below.



**Table 4.11.1: Details of Patent/Design approved**

| Sr. No. | Title of Patent/ Design | Field of Invention | Patent/Design No. | Date of Grant |
|----------------|---|--------------------------|-------------------|---------------|
| Patents | | | | |
| 1 | Nano-biosensor and methods for Detecting Potassium Ion Concentration | Physics | 438688 | 13/07/2023 |
| 2 | A Grain Treater for Pre-Milling Enzymatic Treatment to Pigeon pea | Mechanical Engineering | 470670 | 20/11/2023 |
| 3 | Device for Insects Trapping for Managing Insects | Agricultural Engineering | 478250 | 07/12/2023 |
| 4 | A Process of Enzymatic Pre-treatment on varieties of Pigeon pea | Mechanical Engineering | 486988 | 21/12/2023 |
| 5 | Pomegranate Juice Extractor | Mechanical Engineering | 506284 | 01/02/2024 |
| 6 | Preparation of the Fishing Net Mending Table and its Application for Fabrication and Mending of the Fishing Net | Mechanical Engineering | 528441 | 15/03/2024 |
| Design | | | | |
| 7 | Open Core Throat Less Downdraft Biomass Gasifier | Class 23, Subclass 03 | 394622-001 | 22/03/2024 |

4.11.2 New research programs sanctioned

Various research programmes of Plan, ICAR, RKVY and other agencies were sanctioned during the year 2023-24.

Table 4.12.2 New research programs sanctioned during the year

| SN | Agency | No. of Research Programs | Amount (Rs. in Lakh) |
|----|----------------|--------------------------|----------------------|
| 1 | Plan | 2 | 248.10 |
| 2 | ICAR | 1 | 75.19 |
| 3 | RKVY | 1 | 100.00 |
| 4 | Other Agencies | 18 | 136.36 |
| | Total | 22 | 559.65 |





भारतीय-भारतीय तिलहन अनुसंधान संस्थान
ICAR-Indian Institute of Oilseeds Research
राजिंद्रनगर, हैदराबाद-500 030, तेलंगाना Rajendranagar, Hyderabad-500 030, Telangana
An ISO 9001 : 2015 Institute

All India Coordinated Research Project on Oilseeds (Castor)

Certificate of Excellence

AICRP (Castor) Centre
Junagadh Agricultural University
JUNAGADH
(Gujarat)

has been adjudged as

BEST AICRP (OILSEEDS) CENTRE

by the Quinquennial Review Team (QRT) constituted by
Indian Council of Agricultural Research to review the research work of
ICAR-IIOR and AICRP on Oilseeds for five years (2017-2021).

(R.K. Mathur)
Director
ICAR-IIOR, Hyderabad

Hyderabad
June 1, 2023

(T.R. Sharma)
Deputy Director General (CS)
ICAR, New Delhi

