



**Barani Agricultural Research
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Chakwal**



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ANNUAL ABRIDGED REPORT FOR THE YEAR 2014-15

Overview

Barani tract comprises of 3.10 million hectares out of total 11.38 million hectares under cultivation in Punjab, which is about 30% of the whole Punjab. It is further characterized by different ecological zones depending upon rainfall pattern. This Institute is composed of seven research divisions namely; Crop Breeding, Agronomy, Soil Science, Horticulture, Plant Protection, Agricultural Engineering, Agricultural Economic and Statistics to carry out the research work on cereal, oilseed, fodder, legume and horticultural crops. In addition, five Stations/Sub-stations namely Barani Agricultural Research Station, Fatehjang, Groundnut Research Station, Attock, Horticultural Research Station, Nowshera, Khushab and Barani Research Station, Piplan, district Mianwali are also working under this institute.

Recommendation of new cultivar by experts sub committee for approval.

Groundnut cultivar (02CG002) BARI,-2015.drought tolerant having more pod yield potential than the other approved varieties has been recommended by the experts sub-committee for approval. It bears 90 pods/plant whereas 50 pods/plant of the check variety BARI-2000. Grain yield potential of 02CG002 4126 kg/ha is a drought tolerant disease resistance with medium grain size, variegated seed coat colour and 2-4 seeded pods most suitable for barani cultivation.

CURRENT RESEARCH PROJECTS

Promotion of olive cultivation for economic development and poverty alleviation

Up till now, 80597 plants were imported and all plants have been distributed among 315 farmers having the capability to establish and maintain olive orchards. Olive plantation was done on an area of about 600 acres. Plants of nine promising varieties were also planted at the institute. 115346 olive cuttings were planted under SPTs for the production of true to type olive nursery plants. Two Trainings were conducted for male and

female olive growers on various aspects of olive production technology, value addition, and nursery production. During these trainings, 48 farmers including 13 females were trained. Awareness campaign was launched through seminars at the institute and farmers fields for proper training of olive grower. Delegations from NARC, Arid University and abroad visited the institute and appreciated the activities being carried out including water harvesting techniques.



Olive Multiplication Block at BARI



Olive Orchards at farmer's field

Standardization of Olive Propagation and its Value addition Techniques

Fifteen exotic olive varieties were imported and planted successfully at the institute. Genetic analysis of seven olive varieties through DNA finger printing technique was accomplished. 4213 olive saplings of 7 varieties were distributed among the growers of Pothowar region. Eight orchards

were established at progressive farmer's fields under the technical assistance of the institute by promotional activities under this project. The number of plants at these locations varies from 5000 to 40000 per orchard. An extensive survey was made for whole Punjab for recording of observations for olive adaptability which gave encouraging results. Data was recorded and bud wood was collected and multiplied for farmer's fields. The results on olive propagation protocol development revealed that rooting media of silt, rooting hormone (IBA) concentration of 3000 ppm and spring planting gave better rooting percentage.



Olive cuttings experiments at BARI



Olive cuttings experiments at BARI

Research experiments were carried out for development of techniques of olive value addition with encouraging results. In this regard, recipes of olive pickle, murabba, jam, syrup and bakery products were studied.



Olive value addition in the form of pickle

Watershed Rehabilitation and Irrigation Improvement in Pakistan: Demonstration and Dissemination the Best Practices and Technologies to Help the Rural farmers

Six model orchards under high efficiency irrigation system (HEIS) were developed at farmers' fields and at this institute were maintained; more than 1200 micro-catchments developed in orchards to harvest rainwater were maintained; three rooftop rainwater harvesting structures developed to store rainwater for irrigation under gravitational force; one 2600 watts solar pumping system installed at institute & linked HEIS to reduce electricity expenditures & to save precious water.



Solar Pumping System (2600 Watts) linked with HEIS

Five plots of wheat on raised bed in farmers' field were demonstrated, which enhanced

15-25% yield & saved 35-40% irrigation water.



Rooftop rainwater harvesting structure to harvest rainwater

Six tunnels were established & harvested off-season tomato crop under HEIS at both farmer's fields and at BARI.



Growing of off-season vegetables in tunnel

A total of 239 professionals including 25 female in 10 professional trainings and 580 farmers including 182 females were trained on water saving techniques. About 1203 universities & college students including 274 females visited BARI & witnessed ongoing BARI & water saving activities.



Imparting Training on HEIS to farmers

Many dignities/delegates including (Minister Agri., Secretary Agri., MNAs, AARI, NARC, ABAD, DGA (R) Baluchistan, CE PARB etc.) and International delegates (California Univ., Davis USA, USDA, Australia, CIMMYT, USAID, ICARDA, , Newzeland, US Embassy) visited BARI & witnessed ongoing BARI Research & water saving activities. Brochures, video CDs were distributed among professionals & farmers to disseminate these activities.



Imparting Training to professionals on HEIS



Student visit at Rooftop Rainwater Harvesting

Rapid and mass multiplication of olive and grapes through conventional and micro-propagation techniques

The project aims to develop capabilities of mass-scale production of olive nursery plants through tip culture, to produce certified disease free true to type nursery plants (170000) and there after provision of about 60,000 saplings per year to the farmers for olive cultivation and commercialization. It also covers strengthening of germplasm through import of olive & grapes plants (25 varieties each of olive & grapes, 30 plants/variety). Imported, so far, 9 grapes & 5 olive varieties. Established five nurseries of olive & grapes in private sector and 10 model orchards each of olive (2 acre) & grapes (1 acre) in farmers fields in 5 districts (Chakwal, Rawalpindi, Jhelum, Attock & Khushab) during 2014-15.

Furthermore, the project aims to promote grape cultivation in Pothwar region through evaluation of early maturing, high yielding and good quality grape varieties. Also aims to produce certified disease free true to type nursery plants (325000) and after developing capacity, production of 125,000 nursery plants per year for distribution to the farmers will also be done to promote the cottage industry in the area.

Initially, the project was designed for 5 years (2013-18) but now it has been terminated and merged in newly started mega project entitled "Developing Pothwar into an Olive Valley".

Collaboration of field and research activities under Agriculture Innovation Program (AIP)

The project was implemented in collaboration with CIMMYT to evaluate various conservation agricultural practices. A number of on-station as well as farmer participatory activities were conducted during 2015 in dryland region. The initial findings revealed superiority of zero tillage in Mungbean-Wheat cropping system. It was observed that there was no reduction in wheat yield under Mung-bean system during winter 2014-15 as perceived by farming communities. The nutrient management trials at farmers' fields showed 63% increase in wheat yield obtained by the application of recommended dose of fertilizer. A further increase (9%) in wheat grain yield was observed when DAP was applied as basal dose with urea was broadcasted on first rain shower.

CRP DRYLAND SYSTEMS

Research on integrated agricultural production systems for the poor and vulnerable in dry areas

The project was implemented in collaboration with ICARDA to evaluate various climate change mitigation strategies and build resilience for dryland farming communities. Three types of activities were implemented. Crop modeling involved DSSAT calibration for wheat & barley while field activities involved evaluation of latest wheat, chickpea and lentil cultivars at farmers' fields; Around 50 rural women

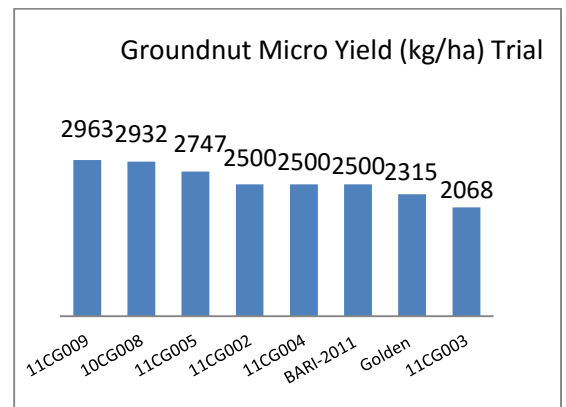
developed their capacity (as master trainers) for value addition locally available fruits and vegetables.

Groundnut

Two hundred and thirty four groundnut entries of diversified genetic background were studied for their characterization. All entries were evaluated on the basis of number of pods/plant, shelling % age, 100 grain weight and yield per plant and will be further studied during the next year. Crosses were made among four desirable varieties /advance lines and all crosses were successful. 101 progenies were selected from filial generations for further evaluation while 07 single plant progenies were selected from mutated population.

Nucleus seed of 25 kg Golden, 30 kg of BARI-2000 and 35 kg of BARI-2011 was produced during the year.

Seven entries were evaluated against check variety BARI 2011 in micro yield trial during the year. Entry PG-11CG009 gave the maximum pod yield 2963 kg/ha whereas check variety gave 2500 kg/ha as shown below.

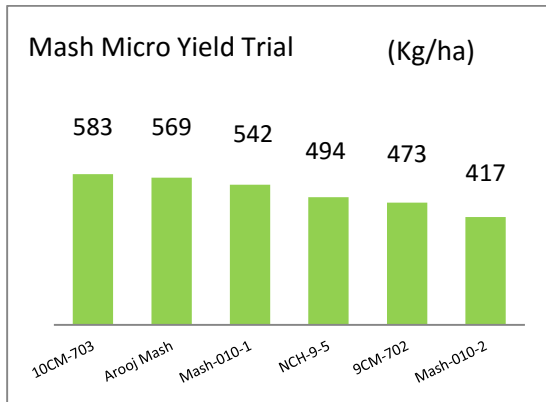


MASH

Fifteen crosses were attempted among the selected mash genotypes. All the crosses were successful and harvested for further studies in F₁ generation.

Seventy crosses / progenies of F₁, F₂, F₃, F₄ and F₅ generations were sown and studied. On field performance basis, 141 single plants / lines were selected for further evaluation in subsequent generations.

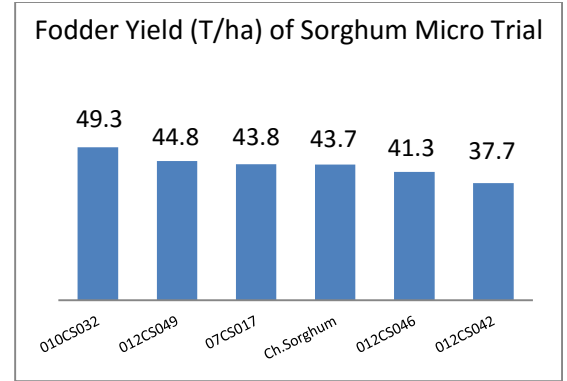
Nine promising lines of mash were evaluated for their yield performance in micro yield trial against check varieties. Five lines performed better than the check varieties under rainfed conditions.



Sorghum

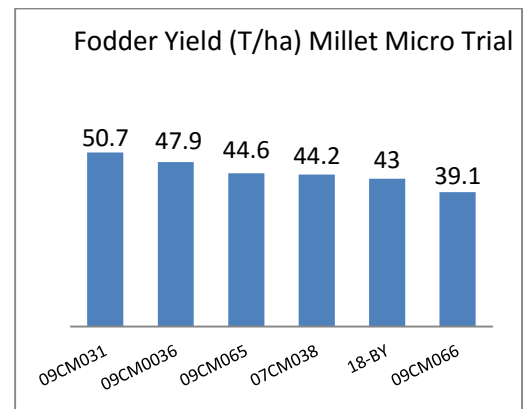
Six new crosses were attempted and harvested successfully for further studies. 90 kg nucleus seed of Chakwal sorghum was produced during the current year.

Six promising lines were evaluated for green fodder yield performance. Three lines 010CS012, 012CS049 and 07CS017 yielded better than check variety Chakwal Sorghum.



Millet

Five elite lines of Pearl Millet were evaluated for green fodder yield performance. Four lines 09CM031, 09CM036, 09CM065 and 07CM038 performed better and gave the more fodder yield than the check variety 18-BY.



WHEAT

A candidate line 6C002 with the proposed name "Ihsan-2015" recommended by the Spot Examination Committee for submission in the upcoming meeting of Expert Sub-Committee. This line is high yielding, having tolerance against stem rust race Ug-99, leaf and yellow rust. IHSAN-2015 has waxy leaves & stiff stem with deep fibrous root system. It has also good chapatti making quality.



Seed multiplication of advance wheat lines



Spot Examination of Ihsan-2015 (6C002) 280 targeted crosses were successfully threshed during the year for further studies. Seven hundred and ninety eight (798) crosses and filial generations (F₁, F₃, F₄, F₅ and F₆) were evaluated in the field. Four hundred and ninety five crosses were selected from these generations for further studies and inclusion in the yield trial.

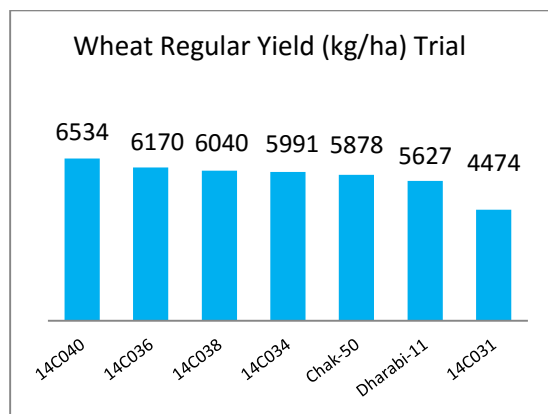


Hybridization work

International trials / nurseries received from CIMMYT/ICARDA, having 598 entries were evaluated and 81 lines were selected on the basis of grain yield and desirable traits for rainfed areas.

In regular yield trial, sixteen entries were tested for their grain yield performance under rainfed conditions.

Four entries viz; 13C048, 12C027, 12C022 and 13C043 gave higher grain yield than the two check varieties. Entry 13C048 gave the maximum yield of 5816 kg/ha. The check varieties Chakwal-50 and Dharabi-11 produced 5437 and 5142 kg/ha respectively. The lowest yield of 3976 kg/ha was obtained from the entry 13C040.



The data revealed highly significant differences among the test entries for yield performance. Four entries viz; 14C040, 14C036, 14C038 and 14C034 gave higher grain yield than the two check varieties. Entry 14C040 gave the maximum yield of 6534 kg/ha. The check varieties Chakwal-50 and Dharabi-11 produced 5878 and 5627 kg/ha, respectively. The lowest yield of 4474 kg/ha was obtained from the entry 14C031.

In Micro Wheat Yield Trial, forty four entries from different institute of Punjab were evaluated. Yield performance of these lines is given below.

Micro Wheat Yield Trial (Rainfed)

S.No.	Yield (Kg/ha)	S.No.	Yield (Kg/ha)
1	5437	23	4500
2	5290	24	4300
3	5273	25	4237
4	5253	26	4197
5	5223	27	4187
6	5203	28	4150
7	5200	29	4100
8	4990	30	3887
9	4917	31	3780
10	4900	32	3757
11	4893	33	3727
12	4887	34	3693
13	4873	35	3680
14	4857	36	3647
15	4773	37	3633
16	4757	38	3590
17	4657	39	3467
18	4650	40	3463
19	4643	41	3387
20	4603	42	3283
21	4543	43	3053
22	4510	44	2740

Entry No. 1 produced maximum grain yield of 5437 kg/ha followed by Entry No.2 which produced 5290 kg/ha. The lowest yield of 2740 kg/ha was obtained from the Entry No.44.



Station wheat yield trial

CHICKPEA

All chickpea yield trials at BARI, Chakwal have been damaged totally due to severe attack of Ascochyta blight in subsequent to heavy rains, wind and hail storms.

LENTIL

Ten new crosses of Lentil were attempted, all were successful and their seed was collected for further studies. Fifty six crosses / progenies of F1, F2, F3, F4 and F5 generations were studied. Out of these, two hundred & fifteen single plants / lines were selected further evaluation in F1, F2, F3, F4 and F5 generations.

In micro yield trial, six entries were evaluated against 3 check varieties. Five lines were selected due to their better yield performance as compared to check varieties.

Olive

The GPU was extended and the total number of olive varieties reached up to 69. During this year, 23 varieties gave fruit.

In the year under report, 4554 true to type olive plants of five promising varieties and 67296 imported olive saplings were distributed among 252 progressive olive growers of the Pothowar region and plantation was done on an area of 536 acres. The facility of oil extraction was provided to 19 olive growers for 1775 kg fruit, which was totally free of cost.

GRAPES

Five new varieties of grapes were added in the genepool viz. Moscatel Romano, Red Globe, Italia, ShunduKhani, Black Kishmish alongwith five Chinese varieties. Current

year Early White variety showed very encouraging results regarding fruit quality and yield. Multiplication blocks including 2000 plants of encouraging grapes varieties are established at the Institute to get maximum cuttings for nursery production. The trend of grape production in Punjab is increasing day by day due to good per acre income by early varieties. In recent year, 10242 true to type grape plants of promising varieties were provided to the progressive growers of the region.

PEACH & NECTARINE

In the existing gene pool of 22 Peach varieties, two exotic Donut peach varieties were added during previous year which showed very encouraging results regarding fruit yield and quality. Two exotic Nectarine varieties were also added during the previous year and take good quality fruit this year. Multiplication blocks of Donut peach and Nectarine were established at the Institute

Meteorological Data for the year 2014-15

Month	Rainfall in mm	Temperature		Humidity %
		Minimum °C	Maximum °C	
July, 2014	110.1	23.0	36.0	47.6
August, 2014	151.80	24.03	33.35	65.71
September, 2014	141.2	21.60	31.80	76.1
October, 2014	74.8	16.19	29.20	61.3
November, 2014	0.0	4.95	24.12	64.9
December, 2014	0.0	-0.7	19.6	83.6
January, 2015	10.8	2.16	16.14	72.8
February, 2015	22.89	5.3	18.00	71.0
March, 2015	205.1	8.77	19.87	77.5
April, 2015	120.0	14.90	29.2	73.0
May, 2015	1.6	18.8	35.8	39.0
June, 2015	48.5	21.82	36.48	47.28

Publications

1. Ijaz, M., M.A. Mian, A. Mahmood and M. Tariq. 2014. Influence of different agro-ecologies on incidence of black point disease of wheat. Paper presented in International Conference of Pakistan Psychopathological Society. January 23-25, 2014, University of Karachi, Karachi, Pakistan.
2. Tariq, M., M.A. Tariq, M.K.N. Shah, M. Ijaz, M.F. Hassan, M. Aftab, N.K. Aadal & T. Hussain. 2014. Genetic and interrelationship of yield and yield related attributes in some genotypes of safflower (*Carthamus tinctorius* L.) under rainfed conditions. *J. Biology, Agriculture and Healthcare*. 4 (3): 130-138.
3. Tariq, M.A., M. Tariq, T. Hussain, M. Iqbal, G. Rabbani, N.K. Aadal, J. Iqbal, A. Rehman & K. Rehman. 2014. Performance based evaluation and selection of different promising lines of rapeseed (*Brassica napus* L.) for shattering tolerance. *J. Biology, Agriculture and Healthcare*. 4 (3): 73-77.
4. Subhani, A., M. Tariq, M. Ashraf and A. Mahmood. 2014. Development of nutritionally enriched, high yielding, drought and disease tolerant doubled haploid wheat genotypes. Presented in the 15th International Congress of Soil Science, 18-20 March 2014, Islamabad-Pakistan.
5. Subhani, A., M. Tariq, A. Mahmood and R. Latif. 2014. Influence of cropping system on planting water content and yields of wheat and chickpea under rainfed conditions. Presented in the 15th International Congress of Soil Science, 18-20 March 2014, Islamabad-Pakistan.
6. Zeeshan, M., W. Arshad, M.I. Khan, S. Ali, M. Tariq. 2014. Character association and casual effects of polygenic traits in spring wheat (*Triticum aestivum* L.) genotypes. *Inter. Agri, Forestry & Fisheries*. 2(1): 16-21.
7. Iqbal, M., N. K. Aadal, T. Hussain, M. A. Tariq and M. Tariq. 2014. Weed management through combined application of allelopathic crop water leachates and reduced doses of herbicide in cotton (*Gossypium hirsutum* L.). *Inter. J. Agron. Agri. Res.* 4(3): 27-34.
8. Tariq, M.A., T. Hussain, I. Ahmad, M. Saghir, M. Batool, M. Safdar and M. Tariq. 2014. Association analysis in Linseed (*Linum usitatissimum* L.). *J. Biology, Agriculture and Healthcare*. 4 (6): 60-62.

9. Hussain, T., M. A., Tariq, I. Ahmad, M. Saghir, M. Batool, M. Safdar, A. Sher and M. Tariq. 2014. Characters association analysis in safflower (*Carthamustinctorium L.*) J. Biology, Agriculture and Healthcare. 4 (6): 63-65.
10. Subhani, A., M. Tariq and R. Latif. 2014. Modern technologies for rainfed areas. Farming Outlook. 13 (1): 2-7.
11. Subhani, A., M. Tariq, A. Mahmood and M. S. Iqbal. 2014. Principal component analysis for the assessment of micronutrients and physiological traits in wheat. Presented in the 5thInternational Conference on Agriculture, Food Security and Climate Change, 9-11September 2014, The University of Poonch, Rawalakot, Azad Kashmir.
12. Subhani, A., M. Tariq, A. Mahmood and M. S. Iqbal. 2014. Bio-fortification of wheat for Zn and Fe content by conventional breeding approaches. Presented in the 5thInternational Conference on Agriculture, Food Security and Climate Change, 9-11September 2014, The University of Poonch, Rawalakot, Azad Kashmir.
13. Musa, M., M. Iqbal, M. Tariq, F. H. Sahi, N. M. Cheema and F. N. Jahan. 2014. Comparative water use efficiency of drip and furrow irrigation systems for off-season vegetables under plastic tunnel. SAARC J. Agri., 12 (1): 62-71.
14. Naveeda, A., A. Feroz, A. Subhani, M.S.Iqbal, M. Tariq, R. Hanif and T. Ashraf. 2014. In vitro multiple shoot, root and callus induction from from different explants in tomato (*Lycopersiconesculentum*Mill). J. Biol. & Med. Sci. 2: 1-6.
15. Naveeda Anjum, Romana Hanif, Muhammad Aqeel Feroz, Abid Subhani, Muhammad Tariq and Muhammad ShahidIqbal.2014. Variability and heritability of onion yield under mild climatic conditions of Chakwal. Climate Change, Outlook and Adaptation. 2 (1): 23-26.

TV/Radio talk	=	09
Urdu publications	=	18
Workshops/Conferences attended	=	07
Visits of different delegation	=	19

Student Classes Visit details during the year 2014-15

Sr. No.	Date of Visit	Class	College/University	No. of Students
1.	17.04.14	M.Sc. Bontny	Punjab College Chakwal	15
2.	18.11.14	7 th Class	Fuji Foundation Model School Jhattla, Chakwal	34
3.	20.11.14	From all Classes	Fuji Foundation Higher Secondary School Chakwal	33
4.	03.12.14	7 th and 8 th Semester	University of Haripuri KPK	50
5.	02.12.14	7 th and 8 th and Class M.Sc. (Hons.)	Fuji Foundation Model School , Chakwal	78
6.	13.12.14	1 st and 3 rd Semester	U.A. Faisalabad	65
7.	14.04.15	6 th Semester B.Sc. (Hons.) d	U.A. Faisalabad	80
8.	24.04.15	M.Sc. (Hons.)	U. of Sargodha	55
9.	27.04.15	B.Sc. (Hons.)	U.A. Faisalabad	43
10.	28.04.15	6 th and 7 th Semester B.Sc. (Hons.)	University of Haripuri KPK	60
11.	07.05.15	B.Sc. (Hons.)	University of Haripuri KPK	45
12.	26.05.15	B.Sc. (Hons.) 8 th Semester	Islamia U. Bahawalpur	26
13.	11.06.15	B.Sc. (Hons.)	U.A. Faisalabad	81
14.	13.06.15	Participant of API	NARC, Islamabad	25