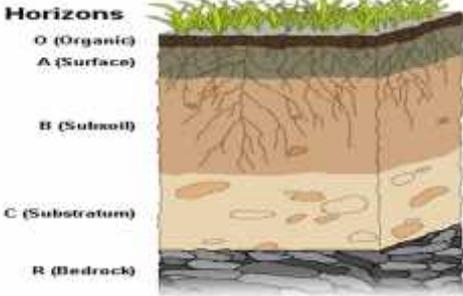


RAPID SOIL FERTILITY SURVEY AND SOIL TESTING INSTITUTE, LAHORE

	<p>Dr. Shahzada Munawar Mehdi Director Tel: +92-42-99233581 Cell: +92-300-7609172 Email: director_sfri@yahoo.com</p>	
---	---	--

OVERVIEW

Better nutrient management is key to achieving better crop yields. Use of nitrogen, phosphorous and potash fertilizers in balanced amounts leads to improved yields. To achieve this objective, provision of soil, water and fertilizer testing services to farmers and development of fertilizer recommendations for crops is main task of this institute. For provision of advisory services to farmers, 97738 advisory soil and 94911 advisory water samples were analysed by various laboratories established by this institute in all districts during 2018-19. In addition to these, 4918 and 3918 soil and water samples respectively were analysed from various research activities. A total of 409399 soil samples were analysed under Extension 2.0 project for farmers' facilitation. Under regulatory services, this institute analysed 6693 fertilizer samples. To develop fertilizer recommendations for different crops, field experiments were conducted at farmers' fields in Punjab Province. During Rabi 2017-18, 307 field trials were conducted; and during Kharif 2018, 288 field experiments were conducted. Data were analysed using appropriate statistical techniques. Optimum rate of fertilizer application was calculated. Experimental results indicated that various crops responded to increasing dose of fertilizer. This appeared due to introduction of high yielding new vegetable varieties and decreasing fertility levels of soil. Micronutrients application was also responded positively by high value crops. In addition to these, this institute is also providing facility of laboratory testing of commercial fertilizers, growth regulators and amendments for their quality monitoring and registration under Fertilizer Control Order.

KHARIF- 2018

Evaluation of Zinc (liquid) Fertigation to Bt. Cotton (April/May Sown)

The experiment was conducted with the objective to compare efficiency of liquid Zn with dust and spray Zn sources on Bt cotton. The results indicated that highest seed cotton yield (2748 kg/ha) was obtained from the treatment where liquid Zn (10%) was applied @ 16 L/ha with first irrigation.

Effect of Zinc Application on Bt. Cotton (April /May Sown)

The studies were conducted at twenty two sites to observe effect of Zn application Bt cotton. NPK was applied to all treatments @ 250-125-100 kg/ha alongwith 1.25 kg/ha of boron. The data showed that maximum seed cotton yield

(2536 kg/ha) was obtained from the treatment where Zn was applied @ 20 kg/ha (Fig.1).

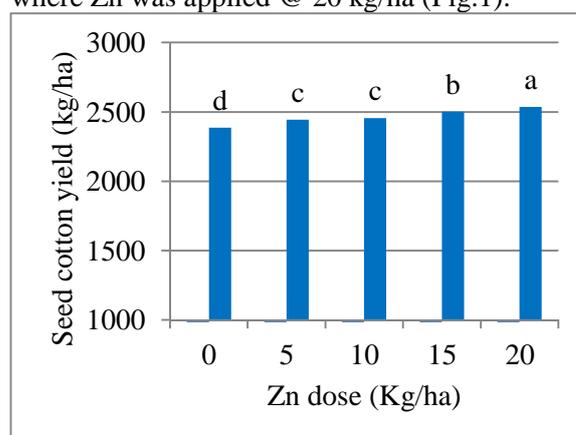


Fig.1. Effect of zinc application on yield of Bt. cotton

Response of Bt. Cotton (April Sown) to Combination of Different Nitrogen and Phosphorus Fertilizers

The said experiment was conducted at sixteen different locations in Central, Cotton and Thal zones of Punjab. It was revealed that highest seed cotton yield (2617 kg/ha) was obtained where Urea or CAN was used alongwith DAP (Figure 2).

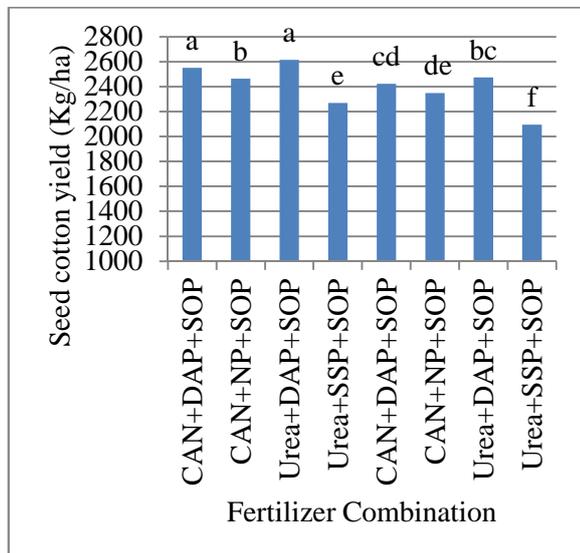


Fig.2. Effect of different fertilizer combinations on seed cotton yield

Fertilizer Response Curve Studies on Bt. Cotton (April/May Sown)

To formulate fertilizer recommendations for Bt. cotton, experiment was conducted at thirty two locations in Central, Cotton and Thal zones. The data revealed that maximum seed cotton yield (2998 kg/ha) was harvested from T8 where N-P₂O₅-K₂O were applied @ 250-188-100 kg/ha.

Response of Bt. Cotton (April/May Sown) to Cu, Fe and Mn

Studies, reported herein, were conducted with the objective to assess the response of Bt. cotton to Cu, Fe and Mn application. The results showed that maximum seed cotton yield (2794 kg/ha) was obtained in cotton zone from T5 where Zn, B, Cu, Fe and Mn were applied @ 5,1,5,15,10 & 10 kg/ha respectively (Fig.3).

Impact Evaluation of Leguminous Crop in Rice-Wheat Cropping System to Improve Soil Fertility

To evaluate the impact of inclusion of legume crop on soil fertility and crop yield in rice-wheat cropping system was the main objective of said experiment. The highest paddy yield of basmati

(6444 kg/ha) was obtained from the treatment where N-P₂O₅-K₂O were applied @ 135-90-60 kg/ha with incorporation of Jantar into soil during first year at sites in cotton zone. At older site, incorporation of jantar in soil improved the rice yield.

Response of Fine Rice to Variable Nitrogen Doses

The said experiment was conducted at seven sites. It was found that maximum yield (5752 kg/ha) was obtained from T7 in rice zone, where nitrogen was applied @ 140 kg/ha.

Response of Fine Rice to Variable Phosphorus Doses

To formulate phosphorus dose recommendations for fine rice, the experiment was conducted at nineteen different locations. Phosphorus doses ranged from 22.5 to 112.5 kg/ha. The data revealed that highest paddy yield (5519 kg/ha) was harvested where phosphorus was applied @ 112.5 kg/ha. Response line is presented in Figure 4.

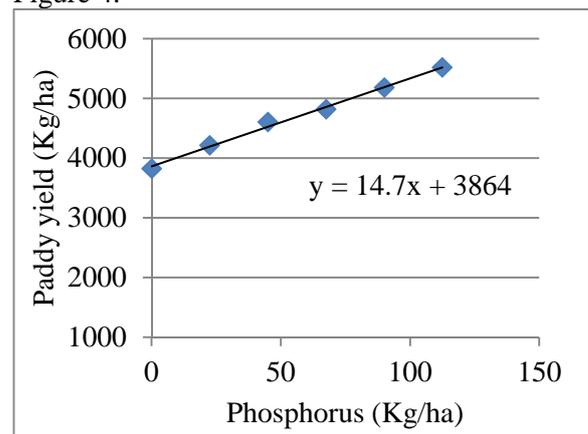


Fig.4. Effect of phosphorus levels on paddy yield

To Explore the Best NP Ratio for Coarse Rice within Limits of Present Farmer Budget for Fertilizer

To explore the most economical NP fertilizer ratio for coarse rice within the limits of present farmer budget for fertilizer was the main purpose of study. The highest paddy yield (6551 kg/ha) was found where NP ratio was 1.5:1.

Fertilizer Response Curve Studies on Coarse Rice

To formulate the fertilizer recommendations for coarse rice, studies reported herein were conducted at four sites in rice zone and one site in central zone. The results envisaged that

maximum paddy yield (6985 kg/ha) was harvested from T8 where NPK were applied @ 174-156-80 kg/ha.

Response Curve Studies on Fine Rice

Studies were conducted at twenty two sites of rice, central and cotton zones to formulate fertilizer recommendations for fine rice. The data showed that highest yield (5389 kg/ha) was harvested from T9 where N-P2O5-K2O were applied @ 135-135-60 kg/ha which indicated that still dose of P can be increased.

Bio-Fortification of Fine and Coarse Rice Varieties with Zinc and Iron

The objective of studies was the bio fortification of rice grains. Foliar spray of iron and zinc was done twice on coarse and fine rice varieties. Foliar spray improved zinc and iron contents in all varieties.

Impact of Burning of Rice Crop Residues on Bacterial Population in Rice-Wheat System

The objective of study was to assess soil bacterial population and organic carbon after stubble burning in rice-wheat cropping system. The results revealed that organic carbon in unburnt field was 0.47% and in the burnt field was 0.36%. Similarly microbial population in unburnt portion of field was 4.11×10^6 GFU⁻¹ Soil and in the burnt portion of field, it was 2047×10^6 GFU⁻¹.

Evaluation of Comparative Efficiency of BNFF Urea for Basmati Rice

Study was conducted to assess efficiency of BNFF urea vs common urea. It was found that maximum paddy yield (5409 kg/ha) was harvested where BNFF urea and common DAP were applied @ 135-90-60 kg/ha.

Fertilizer Response Curve Studies on Maize Fodder (Non-Hybrid Varieties)

The main objective of study was to formulate fertilizer recommendations for maize fodder. The highest maize yield in Barani irrigated areas (60.07 t/ha) and in barani zone (44.44 t/ha) was recorded where NPK were applied @ 130-90-30 kg/ha.

Field Evaluation of IPNI-Nutrient Expert Fertilizer Model for Seasonal Maize

The experiments were conducted with the idea to evaluate Nutrient Expert Fertilizer Model (IPNI). The yield data revealed that maximum

maize yield (7643 kg/ha) was obtained from the treatment where recommended NPK (225-150-125 kg/ha) was applied. Moreover, dose recommended by Nutrient Expert Model (T5) gave higher yield as compared to Farmer Practice (T2). These were first year results. More experiments are needed to conclude (Fig.5).

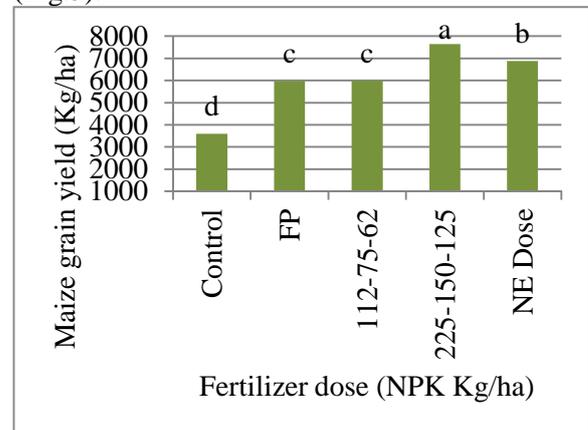


Fig.5. Field evaluation of IPNI model

Effect of Different Sources of Sulphur on Maize Yield

The experiment was conducted to evaluate efficiency of different sources of sulphur i.e. elemental, bentonite and gypsum. In Barani irrigated areas, the highest maize grain yield (8569 t/ha) was obtained where elemental sulphur was applied @ 22 kg/ha which was at par with (8416 kg/ha) gypsum @ 169 kg/ha (Figure 6).

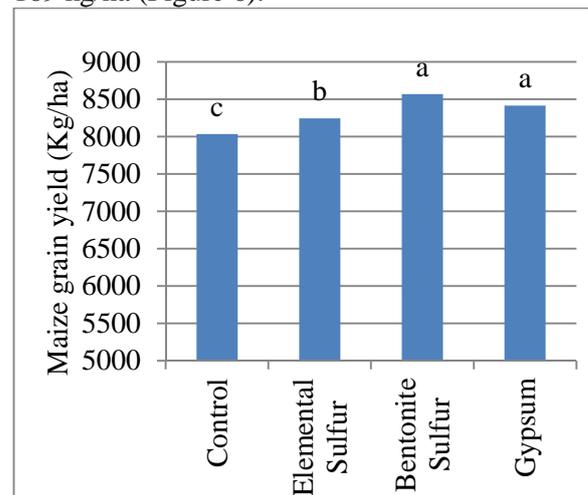


Fig.6. Effect of S sources on maize yield

Effect of Phosphoric Acid (10%) on Sugarcane Yield

The objective of reported studies was to assess response of sugarcane to phosphoric acid (10%)

by weight) product. Cane yields with DAP and Phosphoric acid at Faisalabad were at par.

Response Curve Studies on Sorghum Fodder

The said experiment was conducted at twenty four sites with the objective to formulate fertilizer recommendations. The highest sorghum yield (57.04 t/ha) was harvested from the treatment where NPK were applied @ 80-90-30 kg/ha and it was statistically at par with T5 (56.20 t/ha) where NPK were applied @ 120-60-30 kg/ha.

Fertilizer Response Curve Studies on New Varieties of Groundnut

Experiment reported herein was conducted at three locations in Barani zone. The highest pod yield (2513 kg/ha) was obtained from T9 where NPK were applied @ 69-87-30 kg/ha.

Fertilizer Response Curve Studies on a New Variety (th-6) of Sesamum

The main objective of said study was to formulate fertilizer recommendations. For this purpose, said experiment was designed with eleven treatments and sown at six sites. The highest sesamum yield (1047 kg/ha) was obtained from T8 where NPK were applied @ 60-90-30 kg/ha.

Response Curve Studies on Fertilizer Requirement of Turmeric (Confirmatory Study)

The said confirmatory study with six treatments was conducted at Kasur. The results revealed that highest yield (35.25 t/ha) was obtained from T6 where P₂O₅ was applied @ 200 kg/ha. Yield kept increasing at all levels (Fig.7).

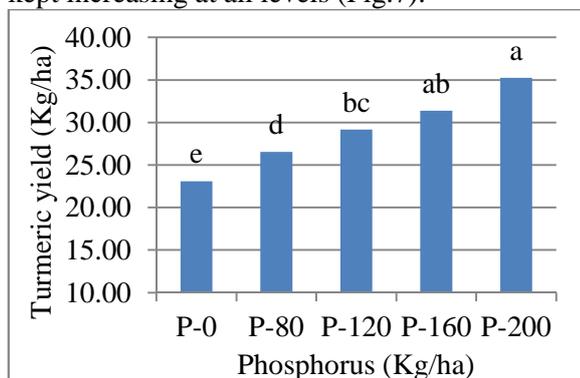


Fig.7. Effect of phosphorus application on turmeric yield

Mung Response to Potassium

The experiment was conducted at eight locations in Rice and Thal zones to observe response of

Mung to K. The yield data envisaged that maximum yield (1485 kg/ha) was harvested from T6 where K₂O was applied 60 kg/ha (Fig.8).

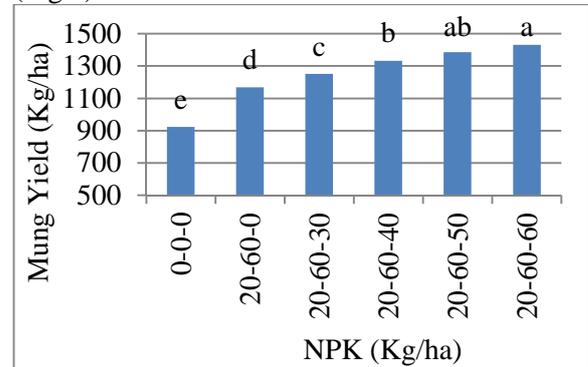


Fig.8. Effect of potash application on mung

Fertilizer Response Curve Studies on Cauliflower

The said studied were conducted at eight locations in barani irrigated zone to formulate fertilizer recommendations. The highest yield (44.34 t/ha) was obtained from T9 where NPK were applied @ 120-150-100 kg/ha. It was statistically at par with T11 (43.27 t/ha) and T6 (43.17 t/ha) where NPK were applied @ 120-100-150 kg/ha 160-100-100 kg/ha respectively.

Developing Testing Fertilizer Prediction Models for Site Specific Fertilizer Recommendations to Bt. Cotton (May Sown), Fine Rice and Maize

The objective of said study was to test and validate fertilizer prediction model for Bt. Cotton, fine rice and maize. The model performed well at lower and upper level of target yields for fine rice and cotton. However, further experimentation is needed in maize model.

RABI 2018-19 Wheat

Fertilizer Response Curve Studies on Wheat in Irrigated Areas

These experiments were conducted in agro-ecological zones of Punjab with eleven treatments. Maximum wheat grain yield (4651 kg/ha) was obtained from T9 where NPK were applied @ 160-171-60 kg/ha.

Fertilizer Response Curve Studies on Wheat under Rainfed Conditions

These experiments were conducted in high rainfall areas of Barani zone with different levels of N, P and K in a single experimental

plan of eleven treatments. Highest wheat grain yield (4700 kg/ha) was obtained from T9 where NPK were applied @ 90-135-60 kg/ha.

Bio-Fortification of Wheat Grains with Different Modes of Zinc and Iron Application

Studies reported herein were conducted at 33 and 24 sites for Zn and Fe respectively in Punjab. Soil and foliar applications were tested for Zn and Fe. These elements increased grain yield of wheat. However, grain analysis is in progress.

Testing the Effectiveness of Bop (Bio-Organic Phosphates) in Enhancing Wheat Yield

To test the effectiveness of BOP, experiment was conducted at nine sites and highest wheat yield (4216 kg/ha) was obtained from T₁ where recommended dose of NPK were applied @ 160-114-60 kg/ha without BOP.

Effect of Burning of Rice Crop Residues on Bacterial Population in Rice-Wheat System

Sixty samples were collected from burnt and unburned portions of rice fields. Analysis showed that total organic carbon and microbial population decreased due to burning of rice crop residues (Table 1).

Table 1. Soil parameters as affected by rice crop residue burning November 2018, 60 sites Sargodha and Faisalabad Divisions

Total Organic Carbon (%)		Microbial Population @ 10 ⁶ CFU G ⁻¹ Soil	
Un-Burnt	Burnt	Un-Burnt	Burnt
0.45	0.31	3.84	2.23

To Compare Efficiency of ‘Urea + DAP’ with ‘Nitrophos + CAN’ Combinations as to be used per their Recommended Times for Wheat crop.

Various sources of nitrogen and phosphorus were compared using recommended (160-114-60 kg/ha) and lower doses (120-85-60 kg/ha) of nitrogen and phosphorus. Urea+DAP and Nitrophos+CAN yield similar results at recommended and lower doses (Figure 9).

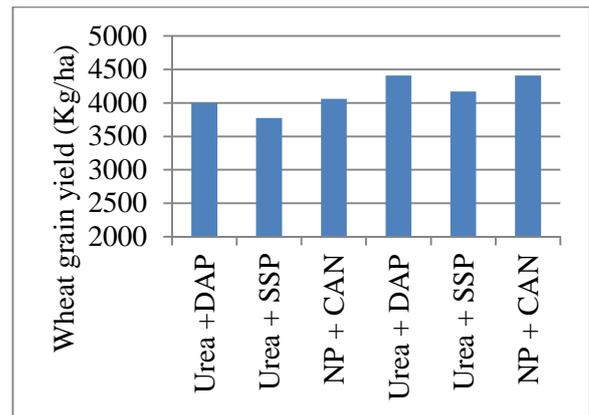


Fig. 9. Effect of fertilizer combinations on grain yield of wheat

Field evaluation of IPNI-Nutrient Expert Fertilizer Model for Wheat

Experiment was conducted at 23 sites in Punjab. Results showed that wheat grain yield from IPNI model was higher than Farmers Practice viz. 4359 vs 3954 kg/ha (Figure 10).

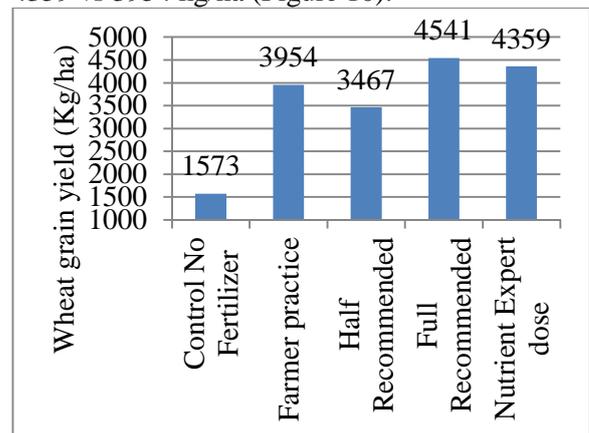


Fig. 10. Comparison of grain yield under different fertilizer recommendations

RABI 2017-18 Other Crops

The results of other crops which were harvested and processed after the compilation of previous report are as under.

Fertilizer Response Curve Studies on Tomatoes

Results showed that highest tomato yield (31.02 t/ha) was obtained with @ 150-320-100 kg/ha. Response of tomato increased from 170 to 320 kg/ha of P₂O₅.

Tomatoes Response to Zinc and Boron

Maximum tomato yield (22.15 t/ha) was obtained where both zinc and boron was applied at @ 5kg/ha and 1 kg/ha respectively. However, it was at par (21.78 t/ha) with 2 sprays of 0.2%

Zn and 0.1% B solution alongwith half dose of Zn and B through soil application.

Fertilizer Response Curve Studies on Onion

Results of increasing doses of P₂O₅ from 160 to 360 were compiled from 9 sites which indicated that onion bulb yield (17.39 t/ha) was increased from 160 to 260 kg/ha of P₂O₅. Further increasing dose of P had non- significant increase.

Fertilizer Response Curve Studies on Potato

Results collected from 11 sites showed that indicated that NPK @450-150-150 and 300-225-150 kg/ha gave highest potato tuber yield (27.42 and 28.35 t/ha).

Role of Potash Application in Higher Doses in Enhancing the Yield of Chillies

Potash was applied @ 80, 160, 240 and 320 kg/ha. Maximum chilli yield (16.38 t/ha) was obtained where K₂O was applied @ 160 kg/ha. In central zone, yield progressed slowly with increasing dose of K (Fig. 11).

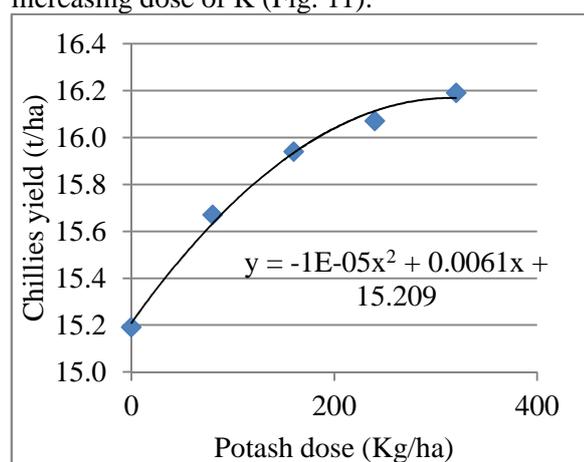


Fig.11. Effect of potash application on chillies yield (Central zone)

Fertilizer Response Curve Studies on Cabbage

This experiment was conducted at four sites with eleven treatments. The results indicated that highest cabbage yield (59.12 t/ha) was obtained where NPK were applied @ 100-150-100 kg/ha.

Best Combination of NPK for Grapes Grown under High Efficiency Irrigation System (Drip Irrigation)

The significant highest grape yield (25.79 kg/plant) was obtained from T₂ where NPK were applied @ 360-120-300 g/plant. Increasing fertilizer beyond this had little increase in yield.

Micronutrients Management and Demonstration for Citrus Orchards

Experiments were conducted at farmers' fields. On average basis, both soil and foliar application were at par with each other with 744 fruits per plant. Similarly, on fruit in kg/plant basis, both treatments were high yielder with 123 kg fruits per plant. Both these treatments had NPK application of 1000-500-1000 kg/plant.

Exploring the Best Fertilizer Combination for Spring Hybrid Maize

Experiments were conducted at farmers' fields at 11 sites. On average basis, increasing N, P and K increased maize grain yield. Highest dose of NPK was 392-261-218 kg/ha where the yield (8495 kg/ha) was still increasing which shows the responsiveness of spring maize to fertilizer application.

Fertilizer Response Curve of Chillies

Highest fruit yield (24.29 t/ha) was obtained from T4 with viz. NPK @ 160-60-60 kg/ha. Increasing the fertilizer dose did not give significant yield increase.

MISCELLANEOUS ACTIVITIES

Regulatory Samples

Regulatory Samples / heavy metal samples.

Fertilizer Regulatory: 2018-19

Total samples analysed: 6693

Fit samples: 6299

Unfit samples: 238

Soil & Water Samples under Advisory Services 2018-19

Soil samples analysed: 97738

Water samples analysed: 94911

Soil & Water Samples of Research Activities 2018-19

Soil samples analysed: 4918

Water samples analysed: 3918

Soil Samples under Extension Services 2.0 2018-19

Total samples analysed: 409399

List of Trainings Received in FY 2018-19 by Officers

1. Forty six officers of this institute attended training on "Implementation of Procurement Management Information System" in December 2018 which was arranged by RAEDC Vehari.
2. Forty officers of this institute attended PPRA rules 2014 training which was arranged by AARI Faisalabad
3. Muhammad Nadeem Agricultural Officer/ Ex-ARO SSRI, Pindi Bhattian, on "Application of Statistical Techniques In Agricultural Research" 24 to 26 Sept 2018 by AARI
4. Muhammad Nadeem Agricultural Officer/ Ex-ARO SSRI, Pindi Bhattian, Hands on Training on "Soil, water and plant" analysis, 30-10-2018 to 1-11-2018 by NIAB.
5. Dr. Sumreen Siddiq and Mr Nadeem Raza on "Training on Monitoring and Evaluation" 30-10-2018 by AARI
6. Dr. Muhammad Mazhar Iqbal and Dr. Muhammad Iqbal Hussain; Training of Tehsil and District Committees on crop appraisal, maintenance of record and harvesting techniques for Holding Rice Yield Competition, 2018-19 dated 9-10-2018 by AARI
7. Four scientists from Soil Fertility Faisalabad on "Emerging Technologies in Research , Advanced MS Office & Digital Resources" 24-25 Sept 2018 by AARI
8. Dr. Ubaid-Ur Rehman and Muhammad Ihsan on "Management of natural resource (Land, water & forest) for sustainable development" 6 to 10 Aug 2018 by AHK NCRD Islamabad
9. Abdul Waheed, Sarfraz Ahmad and Bashir Ahmad on "Environmental impact assessment for development projects" on 3-5 Sept 2018 by AHK NCRD Islamabad
10. Abdul Waheed and Mr Sher Afzal on "Managing Employees' Performance Through Motivation at Workplace" 22 to 24 Oct 2018 by PMI Islamabad
11. Sarfraz Ahmad AAC on "Educational Planning and Management" 22 to 25 Oct 2018
12. Sarfraz Ahmad on "Improving Personal Effectiveness" 15 to 17 Oct 2018 by PMI Islamabad
13. Six persons on "Application of Project in MSPROJECT" 26 to 28 Nov 2018 by PMI Islamabad
14. Five persons on "Environmental Management in rural areas" 5 to 7 Nov 2018 by AHK NCRD Islamabad
15. Dr. Ubaid-Ur-Rehman on "Training on Irrigation System and Water Management" 11 to 20 Dec 2018 by AHK NCRD Islamabad
16. Five persons on Training Course on Communication Skills 13-11-2018 at WMTRI Lahore
17. Imran Hussain, Mahreen Khalid and Rehman Gul on Training Course on Geographical Information System '(GIS)" 14 to 16 Nov 2018
18. Imran Hussain and Muhammad Asif on "Training on Human Resource Management Portal" 12-11-2018 by UVAS
19. Five persons on "Monitoring and evaluation of development projects" 31-12-2018 to 4-1-2018 by AHK NCRD Islamabad
20. "Financial management training" on 24-6-2019 at AARI attended by five persons from SFRI

List of Foreign Visits during 2018-19 by Director / Scientists

1. Dr. Muhammad Shakir, On Training on advance analytical methods of pH, EC, Moisture percentage, Soil Texture and other Macro/Micro nutrients at Soil & Foundation Co. Ltd. Tabouk, Kingdom of Saudi Arabia
2. Dr. Muhammad Shakir attended 3rd Asian Conference on Science, Technology and Medicine at Dubai UAE. Presented research work entitled "Green Remediation of Saline-Sodic Pb-Contaminated Soil by Growing Salt-Tolerant Rice Cultivar along with Soil Applied Inorganic Amendments" at Carlton Plance Hotel, Al Makhtoum Street, Deira Near Deira Clock Tower, Dubai, United Arab Emirates.
3. Dr. Mazhar Iqbal attended 6th Annual Conference of the Asian Council of Science Editors at Dubai UAE 13 to 14 Feb 2018
4. Mussarat Nawaz, attended seminars on "Some insights into the human dimension of the Great Barrier Reef using results from the Social Economical Long Term Monitoring Program (SELTMP) "Entomopathogenic Fungi and Host-Parasite Community Dynamics at Different Latitudes and in Adjoining Agricultural and Hedgerow Habitats "Millennial-Scale Reconstruction of Burdekin River Discharge" Does Habitat

Complexity Shape the Distribution of Herbivorous Fish. Aug 27-29, 2018. James Cook University Australia.

Farmer days/Farmer Training organized in 2018-19

No. of Farmer Days: 12 in various districts Toba Tek Singh, Sargodha, Bhakkar, Layyah, Sahiwal etc. About 70-200 participants came in each event.

SENIOR SCIENTIST

Headquarter

Dr. Muhammad Akram Qazi
Agricultural Chemist Training (HQ), Lahore
0300-4533275
makramqazi@gmail.com

Dr. Abdul Ghaffar Khan
Assistant Soil Fertility Officer (HQ)
Lahore
0307-4025723

Dr. Muhammad Shakar
Assistant Soil Fertility Officer (HQ)
Lahore
0342-6604707

Field wing

Muhammad Nasir
Soil Fertility Officer, Multan
0300-6325608, sfozinc@gmail.com

Dr. Muhammad Nadeem Iqbal
Soil Fertility Officer Faisalabad
0333-6855160, sfofsd@yahoo.com

Mr. Shahid Yaqub Naz
Assistant Soil Fertility Officer, Rawalpindi (Rtd May 2019), 0333-5259834,
asfo_rwp@gmail.com

Mr. Muhammad Akram
Assistant Soil Fertility Officer, Multan
0345-7022263, asfo.061@gmail.com

Dr. Zaffar Abbas
Assistant Soil Fertility Officer, Bahawalpur
0321-6823568, asfobahawalpur@gmail.com

Muhammad Hussain
Assistant Soil Fertility Officer, Faisalabad

Soil & Water Testing Laboratories for Research under Soil Fertility Directorate

Bahawalpur

Mr. Muhammad Ashraf
Agri. Chemist (SF)
0302-7734577, agrichemistbwp@yahoo.com

D. G. Khan

Dr. Rehmatullah
Agri. Chemist (SF)
0333-6032657, swtl_dgk@yahoo.com

Faisalabad

Muhammad Aleem Sarwar
Agri. Chemist (SF.)
0345-7672227, swtl_fsd@yahoo.com

Gujranwala

Dr. Abid Ali
Agri. Chemist (SF)
0321-6657377, agrichemistgwl@hotmail.com

Lahore

Mr. Muhammad Sadiq
Agri. Chemist, Lahore
0301-6508384

Multan

Mr. Fayyaz Ahmad Tahir
Agri. Chemist (SF)
0301-7498821, swt_mlt@yahoo.com

Rawalpindi

Dr. Obaid ul Rahman
Agri. Chemist (SF)
0332-5645033, agrichemist.rwp@gmail.com

Sargodha

Mr. Mansoor Azam
Agri. Chemist (SF), Sargodha
0322-7119822, agrichemist_sgdlab@yahoo.com