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Overview

Agriculture is key sector of Pakistan economy. Maximum potential of crops can only be achieved with balanced use of N, P and K.

During the year 2017-18 (up to May 31, 2018), 73474 soil and 14774 water were analysed by this institute to provide advisory services to the farmers and 590000 soil samples under Extension 2.0 project. A total of 4897 fertilizer samples were analysed for regulatory purposes. Field experiments were conducted in all agro-ecologies zones of Punjab Province to develop fertilizer recommendations for various crops including maintenance of soil health. A total of 383 field experiments were sown during Rabi 2017-18. The results are being compiled. These will be included in the coming report. The data of Kharif 2017 is presented in this report. Marginal rate of return (MRR) technique was used to assess economic optimum rate of fertilizer application and for maximum rate of fertilizer application. With the introduction of high yielding new vegetable varieties, fertilizer application rates were found high to get higher yields according to their potential. The main objectives of Soil Fertility Research Institute are:

Brief objectives of institute are:

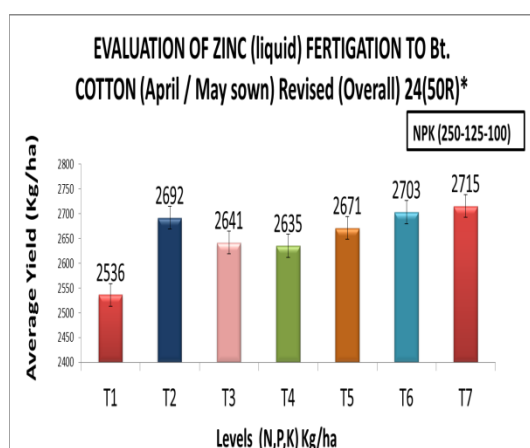
- i. Assessment of fertility status of the soils through field experimentation and suitable laboratory techniques.
- ii. Indexation of nutrients in soil and plant tissue for better understanding of their role in plant growth.
- iii. Research on balanced use of fertilizers for arable crops and orchards.
- iv. Provision of soil, water, fertilizer and plant testing service to farmers and researchers

Laboratory testing of commercial fertilizers, growth regulators and amendments for their quality monitoring and registration under FCO.

KHARIF- 2017

Evaluation of zinc (liquid) fertigation to Bt. cotton (April/May sown)

The studies were conducted at twenty four farmers' fields. The highest seed cotton yield (2715 kg/ha) was recorded from the treatment where Zn(10%) was applied @ 16 L/ha with first irrigation.



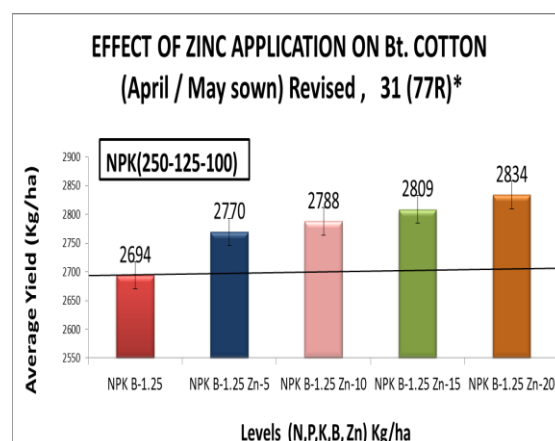
Effect of Stance on Bt Cotton Crop (May Sown).

The experiment was conducted at two sites of Multan. The maximum seed cotton yield was obtained from T2 where cyclinide + mepiquat chloride (stance) – four sprays (dose=50 ml per acre) were applied. The yield at first site was 2629 kg/ha while at second site it was 2590 kg/ha.

Effect of Zinc application on Bt. Cotton (April sown).

The experiment was laid out at thirty one locations. T5 gave the maximum seed cotton yield (2834 kg/ha) where

Zn was applied @ 20 kg/ha through broadcast.

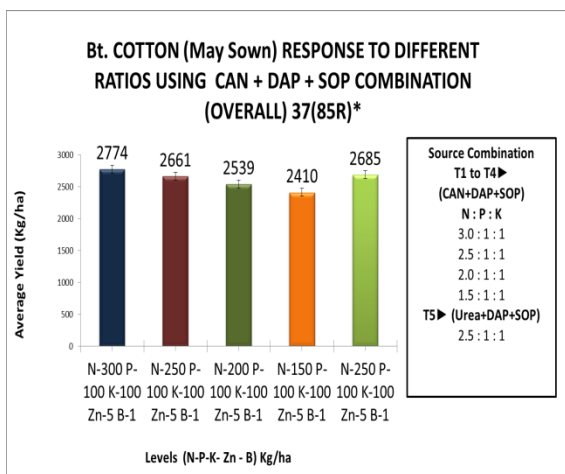


Fertilizer response curve studies on Bt. Cotton (April sown)

Field studies were carried out at thirty six locations in cotton, central and Thal zones. The highest seed cotton yield (2783 kg/ha) was obtained from T8 where NPK were applied @ 250-188-100 kg/ha.

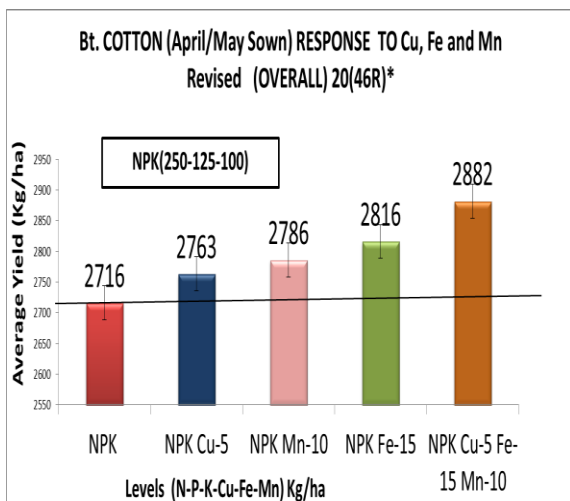
Bt. Cotton (April sown) response to different ratios using CAN+DAP+SOP Combination

Studies were conducted at thirty seven sites of central, cotton and Thal zones. The highest seed cotton yield (2774 kg/ha) where NPK were applied @ 300-100-100 kg/ha and the ration of N:P:K was 3:1:1.



Bt. Cotton (April sown) response to Cu, Fe and Mn.

The studies were conducted at twenty locations in central, cotton and Thal zones. Maximum seed cotton yield (2882 kg/ha) was obtained from T5 where Zn, B, Cu, Fe & Mn were applied @ 5,1,5,15 & 10 kg/ha along with recommended dose of NPK.



Impact evaluation of leguminous crop in Rice-Wheat cropping system to improve soil fertility.

The experiment was carried out in central and cotton zones. Maximum paddy yield (5131 kg/ha) was obtained

from T2 where leguminous (jantar) was sown in mid March and full recommended dose of NPK were applied.

Response of Fine Rice to variable nitrogen doses

The yield data of nine experiments from rice and central zones indicated that maximum paddy yield (5185 kg/ha) was obtained from T7 where nitrogen was applied @ 140 kg/ha.

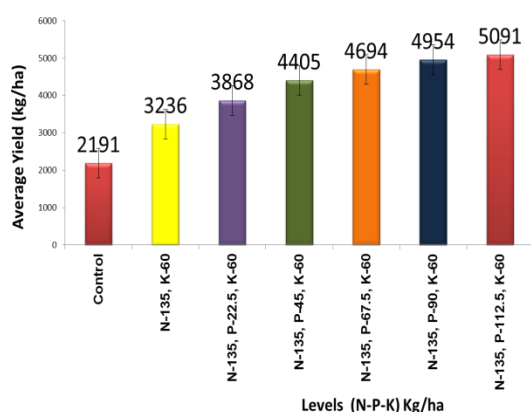
Fertilizer response curve studies on Coarse Rice.

Seven sites at farmers' field were selected to conduct the said experiment. The maximum paddy yield (6279 kg/ha) was obtained from T8 where NPK were applied @ 174-156-80 kg/ha.

Response of Fine Rice to variable phosphorus doses.

Nine experiments were conducted at different locations of rice and central zones. The highest paddy yield (5091 kg/ha) was obtained from T7 where P₂O₅ was applied @ 112.5 kg/ha.

RESPONSE OF FINE RICE TO VARIABLE PHOSPHORUS DOSES New OVERALL 9(23R)*



Fertilizer response curve studies on Fine Rice.

The yield data of twenty five experimental sites envisaged that highest paddy yield (5369 kg/ha) was obtained from T9 where NPK were applied @ 135-135-60 kg/ha.

Bio-fortification of Fine Rice varieties with Zinc and Iron.

The results showed that variety PK-386 gave maximum paddy yield (6284 kg/ha) where two sprays of 0.1% Zn and two sprays of 0.2% Fe were applied along with recommended dose of NPK.

Bio-fortification of Coarse Rice varieties with Zinc and Iron

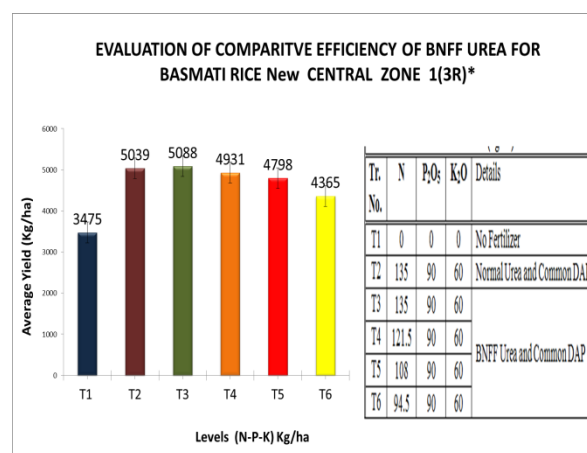
The results indicated that variety KSK-434 gave maximum paddy yield (5821 kg/ha) where two sprays of 0.1% Zn and two sprays of 0.2% Fe were applied along with recommended dose of NPK.

Impact of burning of Rice crop residues on bacterial population in Rice-Wheat system

Soil samples were collected from different farmer fields from burnt and un-burnt portions. The total organic carbon from un burnt portion of field was 0.52% while from burnt portion it was 0.39%. Similarly, microbial population in un burnt portion was 7.11×10^6 CFU G⁻¹ soil and in burnt portion it was 3.71×10^6 CFU G⁻¹ soil.

Evaluation of Comparative efficiency of BNFF urea for rice.

The results showed that in rice zone, the maximum paddy yield (6660 kg/ha) was obtained from the treatment where BNFF Urea and common DAP were applied @ 135-90-60 kg/ha. In central zone, the highest paddy yield (5088 kg/ha) at the same fertilizer dose was applied.

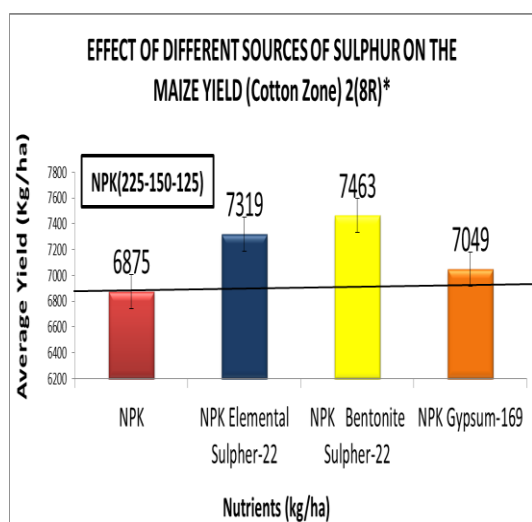


Fertilizer response curve studies on Maize Fodder (Non hybrid varieties).

The average of thirty four experiments conducted in central, cotton and barani zones indicated that the highest fodder yield (54.85 t/ha) was obtained from T8 where NPK were applied @ 130-90-30 kg/ha.

Effect of different sources of sulphur on the maize yield.

The results indicated that the highest maize grain yield in rice zone (6126 kg/ha), cotton zone (7463 kg/ha) and barani (7008 kg/ha) zones was obtained from T3 where bentonite sulphur was applied @ 22 kg/ha along with recommended dose of NPK.



Fertilizer response curve studies on Sorghum Fodder.

The average yield data, of twenty seven experiments, collected from central and cotton zones indicated the highest yield

(53.507 t/ha) in T5 where NPK were applied @ 120-60-30 kg/ha.

Fertilizer response curve studies on Groundnut

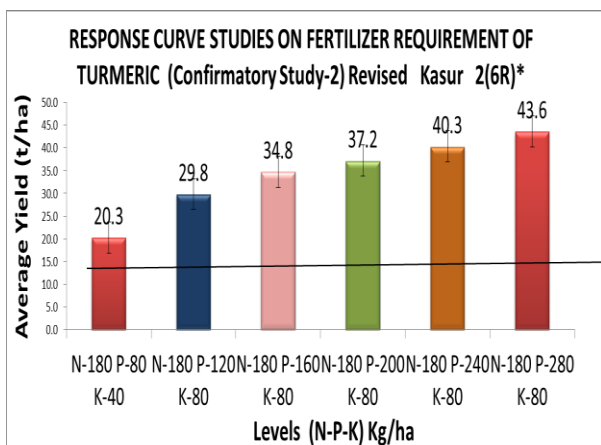
The experiment was conducted at two locations. At Bhawalnagar, the maximum pod yield (1593 kg/ha) was obtained where NPK was applied @ 69-87-30 kg/ha. While at Attock, the highest pod yield (2278 kg/ha) was obtained where NPK was applied @ 69-58-60 kg/ha

Fertilizer response curve studies on a new variety (TH-6) of Sesamum.

The average yield data of eleven experimental sites showed maximum sesamum yield (1020 kg/ha) in T8 where NPK were applied @ 60-90-30 kg/ha.

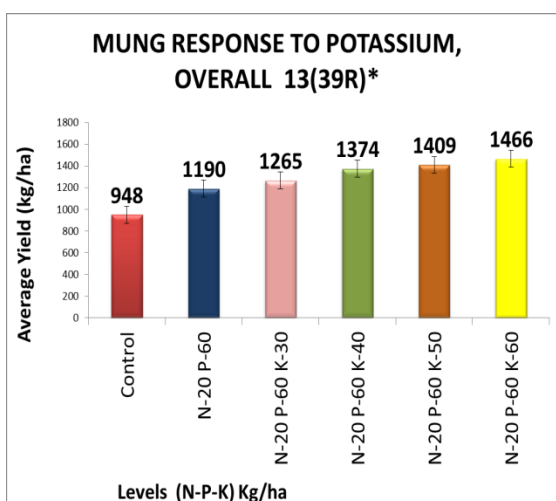
Response curve studies on fertilizer requirement of Turmeric. (Confirmatory Study-1)

The studies were conducted at two farmers' field in Kasur. The highest yield (43.62 t/ha) was obtained from T6 where NPK were applied @ 180-200-80 kg/ha.



Mung response to Potassium.

The average yield of thirteen experiments conducted in cotton and Thal zones showed the highest mung yield (1466 kg/ha) was obtained from T6 where K₂O was applied @ 60 kg/ha.



Fertilizer response curve studies on Cauliflower.

Studies were conducted at six locations in barani irrigated zones. The maximum cauliflower yield (47.548 t/ha) was obtained from T9 where NPK were applied @ 120-150-100 kg/ha.

Developing and testing fertilizer prediction models for site specific fertilizer recommendations to Bt. Cotton (May sown).

The maximum yield (2754 kg/ha) was obtained from T4 where NPK were applied @ 279-135-80 kg/ha.

Developing and testing fertilizer prediction models for site specific fertilizer recommendations for Fine Rice varieties.

The experiment was conducted at five different sites. The maximum yield at these locations was obtained from T3 where NPK were applied @ 129-100-24 kg/ha.

Developing and testing fertilizer prediction models for site specific fertilizer recommendations for Coarse Rice varieties.

The studies were conducted at four locations. At these locations the yield varied in all treatments. Even the same treatment gave different yield at different locations.

Developing and testing fertilizer prediction models for site specific fertilizer recommendations for Maize.

The experiment was conducted at seven different locations at farmers' field. The results showed that T8 (NPK

applied @ 225-150-125 kg/ha) gave maximum yield at all these locations.

To explore the best NP Ratio for basmati rice within limits of present farmer budget for fertilizer.

Studied were conducted at twenty eight different locations of rice, central and cotton zones. The highest paddy (5557 kg/ha) was obtained from T7 where recommended fertilizer dose was applied.

Yield and quality enhancement of cotton crop by long term application of soil amendments in calcareous soil

The yield data envisaged that highest seed cotton yield (3615 kg/ha) NPK were applied @ 398-143-124 kg/ha along with S and FYM @ 74 and 2500 kg/ha respectively.

Regulatory Samples

Regulatory Samples / heavy metal samples.

Fertilizer regulatory:2016-17

Total samples analysed: 6418

No. of fit samples: 5915

No. of unfit samples: 503

Fertilizer regulatory: 2017-18

Total samples analysed: 4897

No. of fit samples: 4682

No. of unfit samples: 215

Soil & Water Samples

Water Samples: 2016-17

Total samples analysed: 10424

Water Samples: 2017-18

Total samples analysed: 14774

Soil Samples: 2016-17

Total samples analysed: 106245

Soil Samples: 2017-18

Total samples analysed: 73474

List of Trainings Received

1. Mr. Sarfraz Ahmad. Effective Communication Skills. 08.1.2018 to 10.1.2018. Pakistan Manpower Institute, Ministry of Federal Education and Professional Training, Islamabad.
2. Dr. Muhammad Shakar & Mrs Balqees Akhtar. IT and Computer Skills. 08.01.2018 to 12.01.2018. Water Management Training Institute, Punjab, Lahore.
3. 9 Analysts. Quality Assurance of labs for ISO/IEC:2005. 15.01.2018 to 15.02.2018. PCSIR, Lahore.
4. Dr. Obaid-ur-Rehman, Syed Asghar Hussain Shah & Raja Abad Ali. Planning & Management of Rural Development Projects. 26.02.2018 to 02.03.2018. AHK National Centre for Rural Development, Establishment

Division, Government of Pakistan, Islamabad.

5. 17 DDOs of this institute. Bidding Documents & PPRA Rules. 8.3.2018. Agriculture Delivery Unit, Agriculture Department.
6. Dr. Shahzada Munawar Mehdi, Dr. Abid Ali, Dr. Sumreen Siddique, Dr. Muhammad Shakar, Dr. Abdul Ghaffar Khan. Monitoring & Evaluation. 09.03.2018 to 10.03.2018. Professional Institute for Research & Training, Lahore.
7. Mr. Muhammad Shoaib Aslam. Role of Information Technology in Agriculture Research. 12.3.2018 to 14.03.2018. Ayub Agricultural Research Institute, Faisalabad.

List of Foreign Visits/trainings

8. Mr. Musarrat Nawaz. Farming Community Activity (Combined Use of Fresh Water and City Waste for Crop Production). 01.03.2018. Al-Dar, Kingdom of Saudi Arabia 3.2018.

Farmer Days

9. No. of Farmer Days: 8 in various districts Toba Tek Singh, Sargodha on citrus; Okara, Sahiwal, Sheikhpura and Gujranwala

districts on tunnel vegetables. About 100 participants came in each event.

List of Publications

10. Muhammad Abdullah, Amanat Ali, Muhammad Tahir Shah, Azhar Mahmood, Sajid Ali and Nukshab Zeeshan. Salinity and fertility status of tubewell irrigated soil in tehsil Shorkot, Pakistan. Int. J. Agric. Appl. Sci. Vol.9, No.1, 2017 (P 68-74).
11. **M.M. Iqbal**, G. Murtaza, **S.M. Mehdi**, T.Naz, A. Rehman, O. Farooq, M. Ali, M. Sabir, M. Ashraf, G. Sarwar and G. Du Laing. Evaluation of phosphorus and zinc interaction effects on wheat grown in saline-sodic soil. Pakistan Journal of Agricultural Science. 54(3), 531-537 (IF: 0.597)
12. M. Ahmad, A. Hussain, M.F.Z. Akhtar, M. Zafar-UI-Hye, **M.M. Iqbal**, T. Naz, Z. Iqbal. Effectiveness of multi-strain biofertilizer in combination with organic sources for improving the productivity of chickpea in drought ecology. Asian Journal of Agriculture and Biology. Article ID AJAB-2017-07-069, HEC Recognized Z-Category.
13. Sadiq Naveed, A. Rahim, M. Imran, M.A. Bashir, M. F. Anwar & F. Ahmad. Organic manures: an

- effective move towards maize grain Bio-fortification. International Journal of Recycling of organic Waste in Agriculture. 7(19): 1-9. Published (17th March, 2018)
14. Sumreen Siddiq; Usman Saleem; Khurshid Ahmad; Alia Anayat; Quais Affan; Muhammad Fraz; Hina Nazir; Naeem Asghar. Comparison of Conventional and Non-Conventional Carriers for Bacterial Survival and Plant Growth. International Journal of Agriculture Innovations and Research. 6(4): 126-129. Published volume 6, Issue 4, ISSN (Online) 2319-1473 (4 Jan, 2018)
15. Umair Riaz, Zafar Abbas, Qamar uz Zaman, Muhammad Mubashir, Mahwish Jabeen, Syed Ali Zulqadar, Zeenat Javeed, Saeed-ur-Rehman, Muhammad Ashraf and Muhammad Javid Qamar. Evaluation of ground water quality for irrigation purposes and effect on crop yields. A GIS Based Study of Bahawalpur. Pakistan Journal of Agricultural Research. Published March 15, 2018.
16. Rashid I., Murtaza G., Zahir Z.A., Farooq M. Effect of humic and fulvic acid transformation on cadmium availability to wheat cultivars in sewage sludge amended soil. Environ Sci. Pollut. Res Int. doi: 10.1007/s11356-018-1821-9. Published / 28 March 2018
17. Rashid I., Murtaza G., Zahir Z.A., Farooq M. Effect of temperature and ageing on sewage sludge decomposition, organic acids transformation and cadmium release. Pakistan Journal of Agricultural Science. 55(1):119-126. Published / March, 2018

NOTE:

A total of 383 field experiments were sown during Rabi 2017-18. Wheat experiments have been harvested and results are being compiled. Vegetable experiments are mostly in field now especially chillies.