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ANNUAL ABRIDGED REPORT 2018-19

OVERVIEW

Plant Pathology Research Institute (PPRI), Faisalabad is primarily working on all doable management strategies against diseases of economically important crops by finding genetic resistance in available crops germplasms, use of antagonistic microbes, use of proper/effective chemicals along with integrated approaches against these crops maladies.

The main objectives of PPRI are, to carry out diagnostic studies on the causes of plant diseases and there management; virus free basic seed production of newly approved potato varieties and identification of resistant crops germplasm from advance breeding material against diseases. Similarly imparting training in modern techniques of Plant Protection to in-service Agri. Extension personnel, sugar mill's field staff and other stakeholders is a regular feature. Evaluation of new chemicals for management of plant diseases and weeds for standardization purpose is also mandate of the Institute.

Evaluation of wheat varieties/ lines against loose smut (*Ustilago tritici)*

Twenty Eight lines/varieties were tested and analyzed for their respective response against Loose Smut by using standard disease rating scale developed by Illyas et al., 2009. Keeping in view, the percentage infection of Loose smut, 08 lines / varieties (14168, Galaxy, 11098, Inqlab-90, 15235, 13165, 142714, HYT-27-21) behaved as moderately Susceptible. (Fig.I)

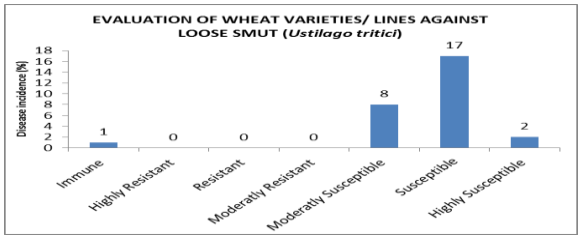

Fig.i. evaluation of wheat varieties/lines against loose smut (ustilago tritici)

Evaluation of sugarcane germplasm against red rot (*Colletotrichum falcatum*)

16 varieties/lines were sown on 14-09-2017 and were inoculated in month of August 2018 with the culture. 6 varieties/ lines viz. S-96-SL-175, SP-576, FD-18, SP-302, S-2002-US-133, 01/SL-424 were found resistant. (Fig.ii)

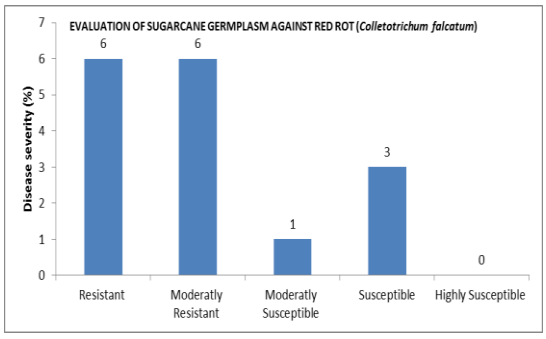

Fig. ii. Evaluation of sugarcane germplasm against red rot (colletotrichum falcatum)

Evaluation of maize germplasm against stalk rot (*Fusarium moniliforme*) disease

Twenty lines/ varieties were tested and analyzed for their respective response against Stalk Rot by using standard disease rating scale developed by Hooker 1956. Keeping in view, the disease severity, 02 lines / varieties (YH5561, YH5140) behaved as moderately resistant. (Fig. iii)

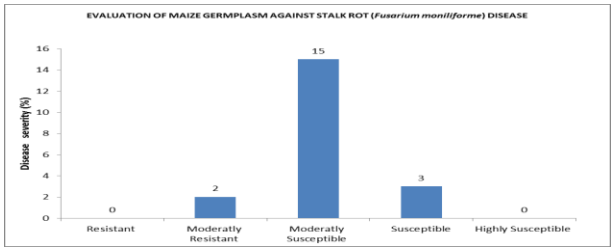

Fig.iii. evaluation of maize germplasm against stalk rot (*fusarium moniliforme*) disease

Evaluation of mungbean germplas agaiint collar rot (*phytophthora megasperma*)

Fifty Mungbean germplasm were evaluated against collar rot disease and data was recorded by using Mayee and Datar, 1986 scale.Nine germplasm were found highly resistant, 9 were resistant, 12 were moderatly resistant, 13 were susceptible and 7 were highly susceptible. (Fig.iv.)

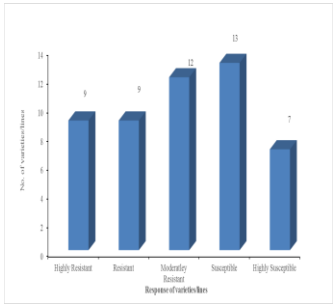

Fig. iv. evaluation of mungbean germplas agaiint collar rot (*phytophthora megasperma*)

Chemical control of bacterial blight of cotton (*xanthomonas campestris* pv. *malvacearum*)

Four different chemicals were evaluated against the disease. Flare-72 SP (Streptomycin Sulphate) significantly controlled the disease as compared to the other treatments. (Fig.v)

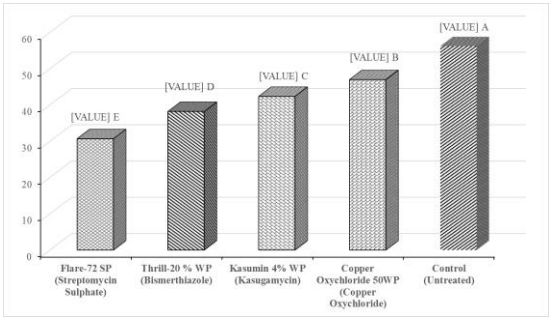

Fig. v. Chemical control of bacterial blight of cotton (*xanthomonas campestris* pv. *malvacearum*)

Different chemicals and biochemicals response against brown spot of rice

Three different fungicides & Two Plant leaf extracts were evaluated to control Brown spot of rice. Nativo 75 WP followed by Moringa leaf extract showed effectiveness to control the diseases as they reduced the disease over control by 75.89 and 63.64% respectively. (Fig. vi)

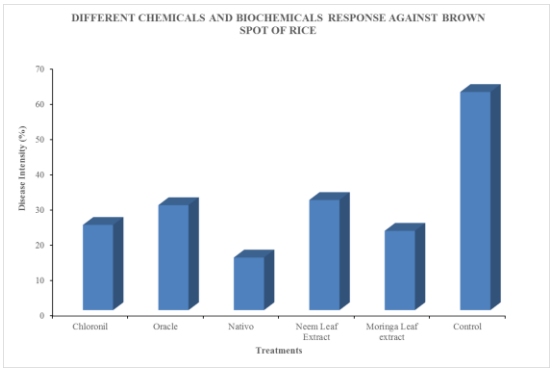

Fig. vi. different chemicals and biochemicals response against brown spot of rice

Impact of sowing dates on epidemiology of stem blight of sesame

Four different dates of sowing were studied to avoid the stem blight of sesame. Least plant mortality was observed in Mid July sowing. (Fig. vii.)

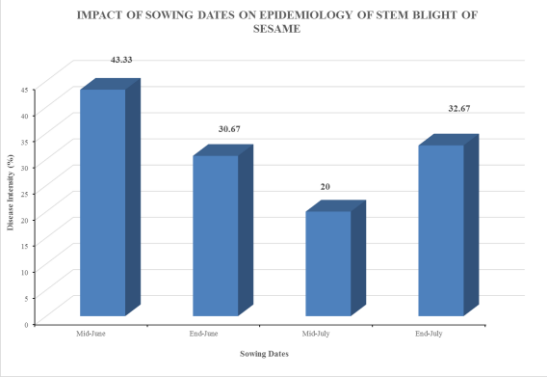

Fig. vii. impact of sowing dates on epidemiology of stem blight of sesame

Chemical control of stem blight of sesame

Four different fungicides were evaluated to control Stem blight disease. Amistar –top 325 SC followed by Nativo 75 WP Checked the disease over control by 69.42 & 63.12% respectively. (Fig. viii.)

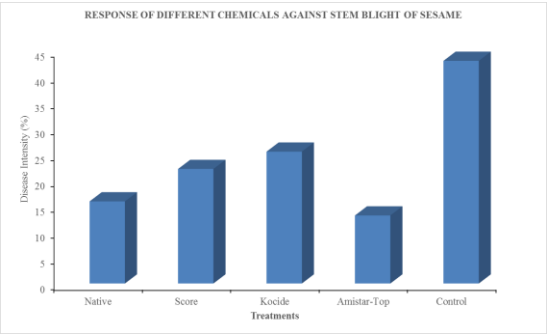

Fig. viii. chemical control of stem blight of sesame

Evaluation of gram germplasm against stem rot (*Sclerotinia minor*)

Fifty One lines/varieties were tested for their response against Stem Rot by using standard disease rating scale developed by G.S. Saharan and Naresh Mehta 2008 (1-6). Keeping in view, the percentage of Stem rot, 06 lines / varieties (TG-1621, TG-1419, TG-1410, TG-1618, TG-1430, TG-1626) behaved as Resistant. (Fig. ix.)

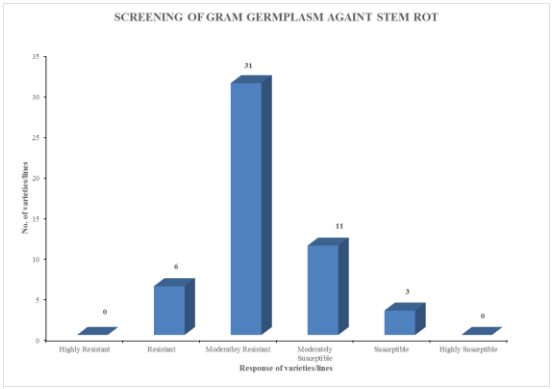

Fig. ix. evaluation of gram germplasm against stem rot (*sclerotinia minor*)

Screening of potato germplasm against common scab (streptomyces scabies)

Forty six Potato varieties/lines were screened against Potato common scab *Streptomyces scabis* in field at Plant Pathology Research Area. Out of 46, Twenty five varieties/lines were found resistant against *S. scabis*. (Fig. x.)

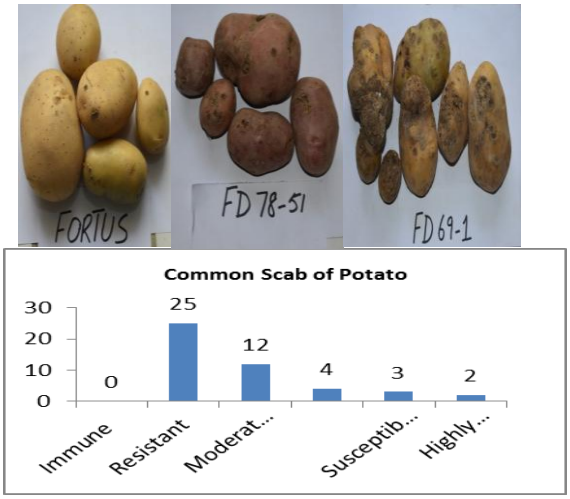

Fig. x. screening of potato germplasm against common scab (streptomyces scabies)

Screening of pea germplasm against root knot nematode (*Meloidogyne incognita*)

Seventeen Pea lines/varieties were screened against Root Knot disease in sick plot and data were recorded by using Tayler and Sasser, 1978 scale. Out of 17, Two were found Resistant, 3 Moderately Resistant, 9 Moderately Susceptible and 3 were Susceptible. (Fig. xi.)

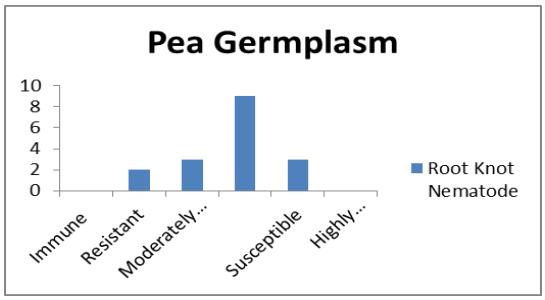

Fig. xi. screening of pea germplasm against root knot nematode (*meloidogyne incognita*)

Response of cotton germplasm against twig & stem blight

To determine the source of resistance among cotton varieties/lines against twig and stem blight, 20 lines/varieties were tested. Among tested varieties, 5 were found Highly Resistant against the disease. (Fig.xii.)

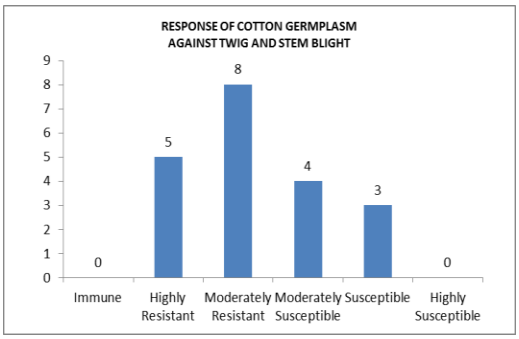

Fig.xii. response of cotton germplasm against twig & stem blight

Chemical control of stem & twig blight of cotton

To evaluate different chemicals for the control of twig & stem blight, disease was artificially produced by spraying spore suspension on crop. Disease data was recorded before and after fungicides application. Score 250 EC produced best results as shown in graph.

Screening of pea germplasm against root knot nematode (*meloidogyne incognita*)

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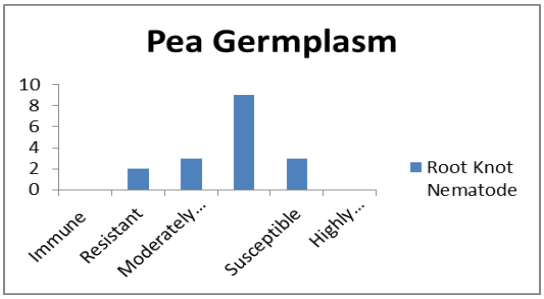

Fig.xiii. pea germplasm

Response of cotton germplasm against twig & stem blight

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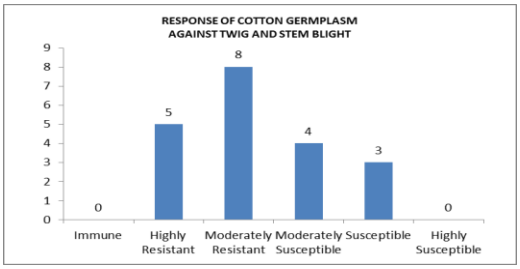

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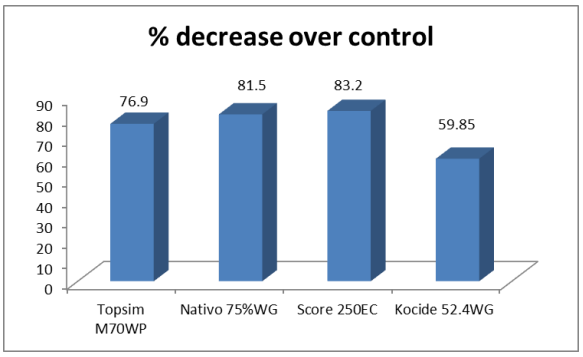
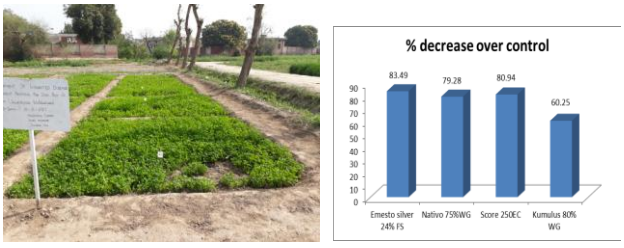


Fig.xv. % decrease over control

Chemical control of stem & crown rot of berseem caused by *Sclerotinia trifoliorum*

The trial was conducted in sick field. Spray of Chemicals was done thoroughly to cover the soil on the appearance of the disease after cutting. Data was recorded according to disease rating scale before cutting. Emesto silver 24% FS produced best results as shown in graph. (Fig.xvi.)



Crown rot of berseem

Fig. xvi. chemical control of stem & crown rot of berseem caused by *sclerotinia trifoliorum*

EVALUATION OF BERSEEM GERMPLASM AGAINST STEM & CROWN ROT *Sclerotinia trifoliorum*

The trial was conducted with the collaboration of Fodder Research Institute Sargodha in sick field. Among tested 10 varieties, 4 were found moderately Resistant (A3, A4, A6, A10) against the disease. (Fig. xvii.)

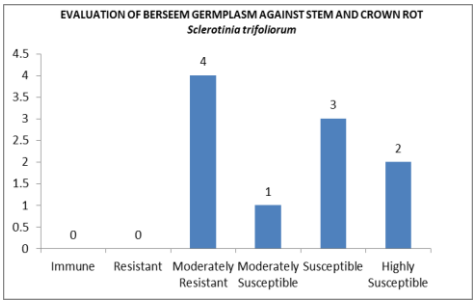


Fig. xvii. evaluation of berseem germplasm against stem & crown rot *sclerotinia trifoliorum*

Biochemicals evaluation of essential oil for the control of late blight of tomato

One fungicide & Two Plant essential oils were evaluated to control Late blight of tomato. Lemongrass essential oil at 1000ppm followed by eucalyptus essential oil at 1000ppm showed effectiveness to control the diseases as they reduced the disease over control by 74.00 and 71.00% respectively. (Fig. xviii.)

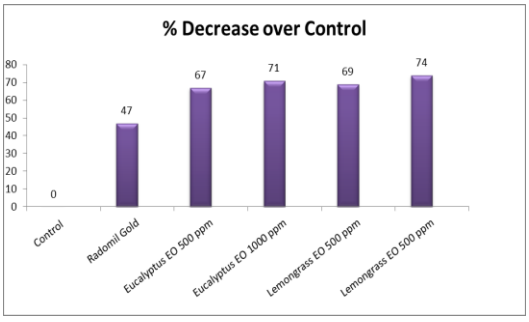


Fig. xviii. biochemicals evaluation of essential oil for the control of late blight of tomato

Efficacy of fungicides against downy mildew of grapes (*plasmopora viticola)*

Six different fungicides were evaluated against the disease. Radomil gold 68% MZ proved effected and % disease over control was 85.41. (Fig.xix.)

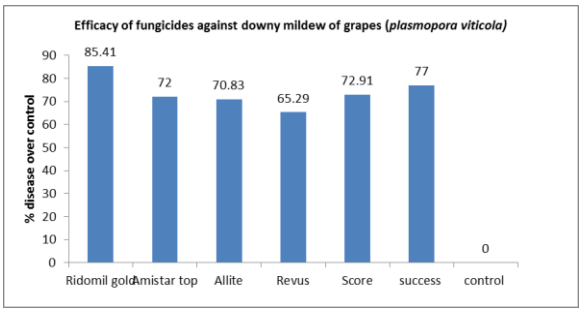


Fig.xix. efficacy of fungicides against downy mildew of grapes (*plasmopora viticola)*

Efficacy of fungicides against powdery mildew of grapes (*uncinula necator)*

Five different fungicides were evaluated against the disease. Topas 100EC proved effected and % disease over control was 92.22. (Fig. xx.)

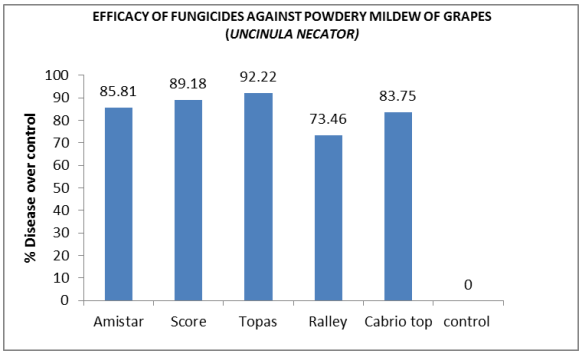


Fig. xx. efficacy of fungicides against powdery mildew of grapes (*uncinula necator)*

Cotton leaf curl virus (CLCUV)

Out of 10 Cotton varieties/Lines supplied by the breeders, **4** cotton varieties (BT-MNH-1016, FH-490, CIM-343 and BT-MNH-1020) were found resistant, **4** were found moderately resistant (FH-444, FH-114, Entry-4, FH-942) and **2** (FH-Lalazar, Gold) were found susceptible to cotton leaf curl virus.

MUNGBEAN / URDBEAN

Mungbean yellow mosaic virus (mymv)

Out of 480 candidate lines, **53** entries showed minimum disease and were found Resistant while **227** entries were found moderately resistant and **55** were found moderately susceptible, susceptible were **75** and highly susceptible were found to be **70**.

Urdbean leaf crinckle virus

Out of 32 candidate lines, **11** entries were found resistant while **4** were moderately resistant, **2** were found moderately susceptible**,** susceptible were found to be **11** and highly susceptible were **4**.

VEGETABLES

Potato viruses (PVX, PVY & PLRV)

13 varieties/ lines of potato were screened against major potato viruses including, potato leaf roll virus (PLRV) and potato virus Y (PVY). PV-X was detected 11% and PLRV was detected 16%. All **13** varieties were highly infected with PVY and categorized as HS, only **3** variety were subjected to be infected with PVX and **5** varieties were infected with PLRV. (Fig. xxi.)

Fig. xxi. potato viruses (pvx, pvy & plrv)

Attack of PLRV and PVX on potato plants

Iris yellow spot virus of onion (IYSV)

Out of **20** genotypes **5** varieties (Red imposta, Mir pur khas, Tarzan, Desi lorgo and Hike) were Highly Resistant (HR), **4 (** VRIO-1, VRIO-6, VRIO-7, PK-10321) were resistant (R), **6** were**(**VRIO-8, HON 301-B, NO. 96, Kasser, HON-300A, Rosa bella) Moderately Resistant (MR), **3** were **(**HON 302-C, Red snack, No.84) Susceptible (S) and **2** (Deshi Red, Pussa Red) were Highly Susceptible (HS). (Fig.xxii)

Fig. xxii. healthy and diseased onion plant (attack of iysv)

Cucumber mosiac virus of cucumber (CMV)

Total **20** varieties were screened against cucumber mosaic virus (CMV). **9** variety (Yalyla-F1, LDR-40, Cu-202-F1, TCB-705, AKAD, AC1801, Hsham-F1, Ac-1802, Prince-starrz-F1) were found Resistant (R), **7** (AC1805-F1, Cu-1947-F1, SV-6352-CD, SV-8552-CB, Yeilder, Alladin, TCB-701) were Moderately Resistant (MR), **1 (**SV-0684-CB) moderately susceptible (MS), **1 (**Cu-1549-F1) Susceptible (S) and **2** (Power-Star-RZ-F1, Sahar-F1) was found Highly Susceptible (HS). (Fig. xxiii.)

Fig. xxiii *cucumber mosaic virus (cmv)*

Tomato yellow leaf curl virus of tomato (TYLCV)

Out of **20** varieties **8** (Glacier, 10160, 10114, 13240, 13210, 16224, Zarnitza and 13220) were resistant, **3** (UC 134, 13239, 13230) moderately resistant (MR), **4 (**16245, 13205, ZHA ZHA and Roma**)** moderately susceptible (MS), **1** Nagina was susceptible (S) and **4** (13202, Nadir, Naqeeb and Pak IT) were found highly susceptible (HS).

Management of CMV in chilli by using systemic resistance inducer chemicals

Test entry Sanam was treated with Mashroom extract + Micro nutrients. Foliar application was completed three times with the interval of 15 days. First spray was completed before flowering. Data was recorded weekly intervals and results were compiled as: (Fig. xxiv.)

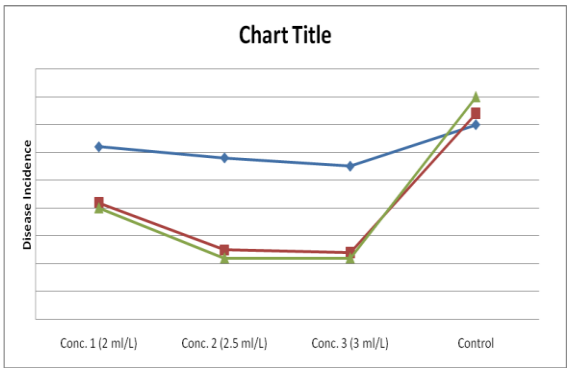


Fig. xxiv. chart title

Graphical representation of disease incidence and effect of three different concentrations of extract

Graph shows that 2nd concentration has significant impact on disease management.

Induced systemic resistance in okra against okra leaf curl virus using plant growth promoting rhizobacteria (PGPR)

To check the impact of PGPR's on disease, plant height and Fruiting, **7** test entries were sown and treatments were applied as seed treatment, soil mixing and foliar sprays of metabolites. (Fig.xxv.)

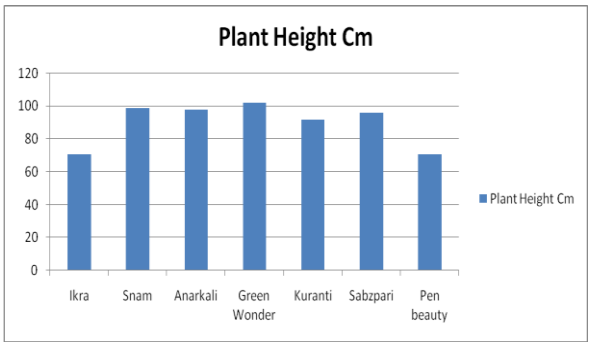


Fig.xxv . impact of pgpr's on plant height

Green wonder>sanam>anarkali>sabzpari>kuranti>pen beauty and ikra (Fig.xxvi.)

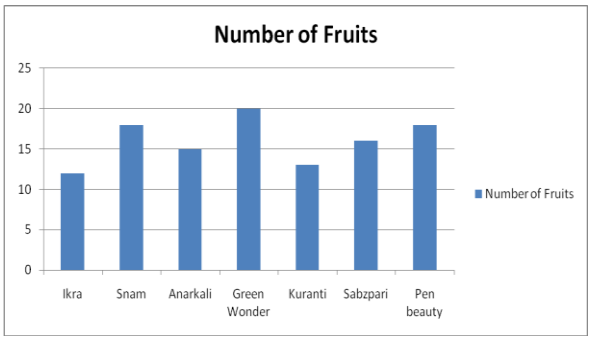


Fig.xxvi impact of pgpr's on fruit yield

Green wonder>Pen beauty & Sanam>Sabzpari>Anarkali>Kuranti>Ikra (Fig. xxvii.)

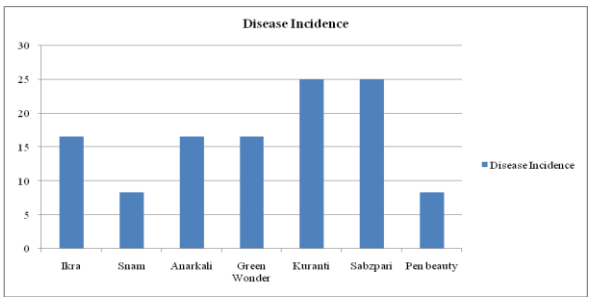


Fig. xxvii. impact of pgpr's on okra yellow leaf curl virus

Pen beauty & Sanam>Ikra, Anarkali & Green wonder>Kuranti & Sabzpari

Results showed that Green wonder, Sanam and Pen beauty are recommended varieties as they showed maximum yield, resistant and improved plant height.

CITRUS

Citrus tristiza clostero virus (CTV)

Total 6787 citrus leaf samples were collected from Sargodha, Faisalabad and T.T.Sing from which 95% samples were fit and 5% were infected with CTV. (Fig. xxviii.)

Fig. xxviii. Sampling of citrus leaf samples for ELISA test against CTV

Tree plantation at section (a significant activity of section) Different fruit plants were planted in the vicinity of plant virology section

to participate in making Pakistan clean and green.(Fig. xxix.)

Fig. xxix. group photo of plant virology team at event of tree plantation

Other significant activity of section is that they successfully managed the viral attack on ornamental flower *Petunia hybrid* by inducing resistance inside its defense mechanism through use of macro nutrients and plant hormones. (Fig. xxx.)

Fig. xxx. diseased and recovered *petunia* plant after application of treatment

RUNNING PROJECTS

ADP Project No. 4138 "Development of integrated management of citrus orchards to enhance the yield and improvement of fruit quality."

PARB Project No.916 "Development and commercialization of tomato hybrids and vegetables suitable for sowing in tunnel and open field of Punjab".

PARB Project No.883 "Preservation, and propagation of healthy Shisham (Dalbergia sissoo) through cloning of resistant germplasm against dieback disease."

CS Project No.155 "Development of suitable strategy for management of common scab of potato (*Streptomyces scabies)"*

FARMER DAY

1. "Strategies for the management of potato common scab (Streptomyces scabies)" Held at Mozza Lasla Waris Chiniot.
2. " Citrus disease Managements" Held at Chack No. 343Jb at T.T. Singh.

URDU ARTICLES:- 01

Radio Talks/ TV Talks:- 15

1. Tarshawa phalon ki virusi bimarian aur unki rok thaam
2. Kapas k zarar rasan keeray aur unka tadarak
3. Mirch ki virusi bemarian aur unka tadarak

Publications:

1. Kamran, M., M. Ehetisham ul Haq, I. Ullah, S. Ali, M. Idrees, H. Abbas and M. Iqbal. 2019. First report of *Sclerotinia sclerotiorum* causing stem rot of Eggplant (*Solanum melongena*) in Pakistan. Plant Disease 103 (03): 589
2. Kamran M., M. Ehetisham Ul Haq, S. Ali, M. Idrees, M. Iqbal, H. Abbas, M.A. Iqbal, M. Rafiq, H. Abbas and N. Subhani. 2018. Response of mungbeen germplasm against collar rot disease, caused by *Phytophthora megasperma* and its chemical management. International Journal of Biosciences. 12(3): 49-55.
3. . Azher Mustafa, Muhammad Mohsan, Muhammad Rizwan Bashir, Muhammad Iqbal, Saba Saeed, Sajid Hussain Zaidi, Arif Muhammad Khan, Muhammad Kashif Hanif. Resistance status of potato germplasm against leaf roll virus under natural field conditions. Int. J. Biosci. 12(6), 275-280, 2018.
4. Assessment of plant defense activators and nutrients for their antiviral potential against cucumber mosaic virus of tomato under natural field condition. Saba Saeed, Azher Mustafa, Sayed Sajid Hussain Zaidi and Muhammad Ussama Yasin. International Conference of Food-Agriculture Sciences and Technologies (IC-FAST) 2019. Journal of United Science and Technology (JUST)
5. Achieving Near Immunity Durable-Type Resistance against Rusts in Advance Wheat Lines by Combining Race Non-Specific Resistance Genes in. Intl. J. Agric. Biol., 21: 251–25Ali, Y., M.A. Khan, M. Hussain, M. Atiq and J.N. Ahmad, 2019.
6. An assessment of the genetic diversity in selected wheat lines using molecular markers and PCA-based cluster analysis APPLIED ECOLOGY AND ENVIRONMENTAL RESEARCH 17(1):931-950 2019, ALÖKI Kft., Budapest, Hungary, Ali, Y., M.A. Khan, M. Hussain, M. Atiq and J.N. Ahmad, 2019.

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