

ICAR-CENTRAL TOBACCO RESEARCH INSTITUTE,
RAJAHMUNDRY - 533 105

PROCEEDINGS OF INSTITUTE RESEARCH COMMITTEE MEETINGS - 2014

INAUGURAL SESSION

Date : 03.09.2014

Chairman : T.G.K. Murthy
Rapporteur: Dr. K. Siva Raju

The Inaugural Session of the Institute Research Committee (IRC) meetings was held on 3rd September 2014. Scientists from ICAR-CTRI and its Research Stations, representatives from trade and Tobacco Board participated in the meeting. The Chief Guest, Dr. K. Gopal, Chairman, Tobacco Board, Guntur inaugurated the meeting by lighting the lamp along with Dr. T.G.K. Murthy, Director, CTRI and Dr. K. Deo Singh, Ex-Director, ICAR-CTRI. The session started with the welcome address by Dr. C. Chandrasekhara Rao, Head, Division of Crop production and Secretary, IRC. Dr. Chandrasekhara Rao mentioned about the importance and objectives of the IRC and also research projects that are being carried in CTRI.

Dr. T.G.K. Murthy, Director, ICAR-CTRI and Chairman of IRC in his inaugural address, mentioned about the importance of IRC in reviewing the on-going projects, formulation of new projects and to guide the scientists. He informed about the on-going projects, paid trials and externally funded projects being conducted in ICAR-CTRI. Presented the important events happened during 2013-14 in the field of research and administration. The variety CH3 was released for KLS by Karnataka State Varietal Release Committee. The variety CH1 hybrid for NLS of Andhra Pradesh was submitted to A.P. State Varietal Release Committee. He also mentioned about the pipe-line varieties JS-117, TBST-2, Tobios-2 and NLST-2. Recombinant Isogenic Lines (RILs) were developed for solanesol, nicotine and TSNA. Experiments on organic tobacco at Hunsur showed low yields at the beginning but started giving higher yields with increase in years of cultivation and low yields were compensated by higher grade outturn. Reduction in fuel wood more than 12% was observed by fitting turbo fan in the barns. Promising new generation chemicals were identified for insect control. ICAR-CTRI is in 2nd position in ICAR system in resource generation. Five scientists of CTRI got awards in various fields. ICAR sanctioned Rs. 1.08 crores for toxicological studies of tobacco seed oil. He thanked the ICAR for giving all out support to the ICAR-CTRI for research including conventional research in tobacco.

Dr. K. Gopal, Chairman, Tobacco Board congratulated the scientists for getting awards and the work carried at ICAR-CTRI by the scientists. He mentioned that the Tobacco Board will collaborate with CTRI in various aspects of tobacco research. To know the tobacco production in some countries, their web-sites were not being accessed. There is a need to cut down the cost of cultivation. India is in the 2nd

position both in income and yield in tobacco. Foreign traders viewed Indian tobacco as cheap leaf, but there are good areas producing very good leaf. Some of the problems in producing the good leaf are poor soil health due to low soil organic matter content. Farmers are not using green manure and most of the lands are exhausted in nutrients. There is a problem of non-availability of CAN and SOP. Some of the farmers are using pesticides indiscriminately but the traders need clean tobacco. The cost of cultivation is increasing and the wood fuel is becoming more costly and its usage is causing de-forestation. He requested the CTRI and trade to help the farmers in reducing the cost of cultivation and to increase the productivity. Finally he appreciated the Scientists for getting the awards and for doing good work.

Dr. K. Deo Singh, Guest of Honour mentioned the good research work carried at ICAR-CTRI and felt that the tobacco will survive for a long time. He mentioned that in India, the non-FCV production is more but the Government has closed the tobacco development board which is required to monitor the non-FCV production in different states. We must look into small land holders and small farmers in different ecological conditions to improve their economy. Indian tobacco has low TSNA and heavy metals which will enhance the Indian tobacco exports. He mentioned that monoculture is not good for agriculture in long-run and it is not sustainable. Diversification of crops is required and sustainability of Indian tobacco depends on the less harmful constituents and remunerative alternative uses. He advocated that scientists, Industry and other development organizations should take care of Indian tobacco. Quality of tobacco can be improved by INM, IPM and GAP. He suggested to do research on health of tobacco workers, product traceability and tobacco seed oil.

Dr. G. Krishna Kumar, Vice-president (leaf operations) ITC-ILTD in his presentation on “emerging leaf requirements” mentioned that the India’s share in tobacco trade in the international market is very small and the quality requirement of the international market is changing. The stringency of requirements in the international market is increasing day by day where there is a demand for traceability to the level farmer. He mentioned the requirement of four basic needs for the growth drives; cost, quality, consistency and sustainability. To maintain the brand image of Indian tobacco, it requires consistency in the quality and cost. We should ensure vertical growth in productivity, management of inputs and quality constituents. There is a need to ensure uniformity in seedling, proper application of fertilizers, customized fertilizers, focus on curing and post curing operations, water use efficiency, improvement in micro-irrigation and fertigation. The session was concluded with vote of thanks by Dr. C. Chandrasekhara Rao, Secretary, IRC.

TECHNICAL SESSION I: CROP IMPROVEMENT

Date : 03.09.2014

Chairman : Dr.R. Lakshminarayana
Rapporteur : Dr. K. Prabhakara Rao

The session started with introductory remarks of Dr. T. G. K. Murthy, Director-Acting, ICAR-CTRI and Dr. R. Lakshminarayana, Session Chairman and Former Project Coordinator, AINRPT, ICAR-CTRI, Rajahmundry.

ICAR-CTRI, Rajahmundry

Dr. T.G.K. Murthy, Head, Division of Crop Improvement presented the activities, research highlights of the Division and achievements of Seed Production Section. He also presented the results of the projects handled by him at Rajahmundry and at ICAR-CTRI RS, Jeelugumilli during the season.

GS .1 : Germplasm acquisition, maintenance, evaluation and utilization

During the season, 178 *bidi*, 3 *rustica* and 75 *Natu* besides 5 exotic FCV lines were added to the germplasm bank, thereby increasing the CTRI genetic resources to 3369. A total of 1752 germplasm lines comprising 59 Flue-cured Virginia, 1080 non-FCV lines and 613 elite lines for various important traits were maintained. Also 218 accessions of 56 wild *Nicotiana* species and two subspecies were maintained in pots / experimental micro plots. Nine exotic interspecific hybrids, 5 hybrids were developed at CTRI and 4 amphidiploids were maintained. Eleven non-flowering accessions were rescued through *in-vitro* micropropagation. One bar coding primer, trnH-psbA was identified as having potential for grouping and cataloguing the species of genus *Nicotiana*. Three genotypes viz., ruling variety Siri, promising advanced interspecific cross derivative TBST-2 and 324C were characterized for 53 morphological DUS characteristics.

Action Point:

- The house suggested for identification and exploiting of non FCV tobacco for biomass and seed yield.

Br.7: Developing hybrid tobacco suitable for Traditional black soils of Andhra Pradesh

During the year, two replicated yield trials were conducted with CMS and fertile hybrids. In the 15 fertile hybrids tested between 3 female parents and five male parents, standard heterosis varied from 17-33%. TB70 X TB102, TB71 X TB104, TB100 X TB84 and TB100 X TB102 found superior among the hybrids. The nicotine and reducing sugar levels were within the admissible limits.

In a new replicated yield trial conducted with 30 CMS hybrids produced between 5 identified CMS parents and six male parents, seven hybrids proved superior to Siri with 3021- 3576 kg/ha cured leaf yield.

Action Point:

- Approved for continuation of the project for the ensuing season.

Cy.2.1 (f): Interspecific hybridization: Incorporation of aphid resistance from wild *Nicotiana* species

Preliminary evaluation for leaf yield potential: Eighty one light cast derivatives with high leaf yield potential (CLY 2400 - 3790 kg/ha) as compared to check variety, Siri (CLY- 1840 kg/ha) were identified. After evaluation, 20 most promising uniform lines were retained for further evaluation in replicated yield trials.

Evaluation of advanced lines in RYT: Out of Twenty four lines evaluated in two replicated trials for the second year 9 lines viz., TBST 92, TBST 93, TBST 98, TBST 99, TBST 100, TBST 101, TBST 104, TBST 108 and TBST 110 showed significant improvement over best check, Siri. The increase varied from 15 to 39% for cured leaf yield, 15 to 46% for bright leaf yield and 17 to 45% for grade index, respectively, over Siri.

In a new replicated trial conducted with 24 lines 11 lines viz., TBST Nos., 112, 116, 117, 122, 125, 126 and 127, 129, 130, 132 and 134 showed significant improvement over the best check, Siri for all the four leaf yield traits.

Bulk and on-farm evaluation: Advanced breeding line TBST-2 which showed superiority over check varieties in multilocation trials at Rajahmundry, Guntur and Kandukur was evaluated against Siri for yield and quality in a bulk trial and also on-farm trials in SBS and SLS areas. The leaf yield potential of TBST 2 (CLY 2450 kg/ha, BLY 1480 kg, GI 2000) was higher than Siri (CLY 2011 kg, BLY 1227 kg and GI 1650).

Lines contributed to AINRPT multilocation trials: 7 (TBST Nos. 67, 68, 70, 71, 72, 73 and 75)

Action Point:

- Approved for continuation of experiments in the ensuing season.

JL. Br.2.1: Evolving FCV tobacco varieties having high yield and better quality suitable for NLS area of Andhra Pradesh

Replicated yield trials

A set of 26 medium/ green cast advanced breeding lines were evaluated along with check Kanchan for leaf yield and quality traits in two trials in a RBD with three replications for the second year in succession.

Eleven lines (RT3-1, RT4-3, RT9-1, RT10-1, RT29-1, RT33-1, RT91-1, RT92-1, RT94-1, RT96-1 and RT108-1) showed significantly higher green leaf yield, cured leaf yield and grade index than check, Kanchan. The increase was 13 to 61% for green leaf yield, 19-68% for cured leaf yield and 21-72% for grade index. Two new replicated yield trials were conducted with 26 medium/ green cast advanced breeding lines along with check Kanchan for leaf yield and quality in a RBD with three replications. Seven lines (RT54-1, RT56-1, RT113-2, RT124-1, RT125-4, RT 127-1 and RT137-2) showed significantly higher leaf yield and grade index than check, Kanchan. The increase was 14 to 33% for green leaf yield, 14-32% for cured leaf and 17-36% grade index. Nine lines FCJ 16 to FCJ 24 were contributed to AINPT.

Action Point:

- Approved for continuation of experiments in the ensuing season.

JL. Br. 3: Developing hybrid FCV tobacco suitable for NLS area of Andhra Pradesh

Out of Sixteen CMS hybrids tested, seven hybrids (MSH-1, MSH-4, MSH-5, MSH-8, MSH-9, MSH-12 and MSH-15) showed significant standard heterosis (22 to 51%) for cured leaf yield over check, Kanchan. Fifteen CMS lines in genetic background of ruling variety, Kanchan and other improved lines were maintained.

Action Point:

- Approved for continuation of experiments in the ensuing season.

JLN-2: Developing new varieties of irrigated *Natu* tobacco for Andhra Pradesh

In the bulk assessment trial *Natu* selections, Sel 47, Sel 45, and 45-90 found promising with 10, 11 and 10% increase in cured leaf yield over Kommugudem. Out of fifteen *Natu* entries assessed in a RBD, seven entries recorded significantly higher cured leaf (18-34%) than check, Kommugudem. Fifteen green cast *Natu* type advanced breeding lines were evaluated in a RBD with three replications along with check Kommugudem for leaf yield and quality. Plant type and leaf colour, body and size were good in entries 1, 2, 3, 6, 7, 10, 11, 12 and 14. Five out of 15 lines with high yield potential and /or TMV resistance tested showed significantly higher (16 to 22%) cured leaf yield than Kommugudem.

Action point :

- The house approved for continuation of experiments in the ensuing season.

Dr. A.V.S.R.Swamy, Principal Scientist presented the results of project Br.8 conducted at ICAR-CTRI, Rajahmundry.

Br.8: Developing tobacco cultivars for high seed yield, oil content, high biomass and other phyto-chemicals

Among the 28 F₁ hybrids and 8 parents evaluated for seed yield, crosses EC.554900 X TI-163 (295 kg/ha), A-119 X GT-8 (282 kg/ha) and EC.554900 X A-145 (279 kg/ha) recorded significantly higher total seed weight. In a set of 28 crosses tested, the crosses HDBRG X VDH-3 (10278 kg/ha), HDBRG X NP-19 (8819 kg/ha) and HDBRG X A-119 (8417 kg/ha) exhibited higher green leaf yield and total biomass (11601, 10435 and 9563 kg/ha, respectively).

Action points:

- Nitrogen levels need to be followed as per the type of crop
- Suggested for calculation of GCA, SCA under ideal conditions
- Repetition of the experiment with lattice design is desirable

Dr. K. Sarala, Principal Scientist presented the results of the experiments, Cy 7(iii), Biotech-6 and MB9 conducted during 2013-14.

Cy7 (iii): Micropropagation of elite lines and other selections

Nicotiana species, R-466 and haploids of crosses, A -145 X GT-7, VA 510 x BA-1, HDBRG x GT 7, Banket A1 x BY 64, Nisnicotinony-121 X Kumkumathri and TI 163 x A 145 were micropropagated during 2013-14. The project was proposed for conclusion.

Action point:

- The project was concluded.

Biotech 6: Molecular mapping of important tobacco traits

Eight SSR markers viz., TM10163, TM10645, PT52585, PT52944, PT60792, PT50528, PT52979 and PT30173 were found to be polymorphic between the parents and bulks of RIL population developed for the mapping of TSNA, nicotine and solanesol traits. Solanesol content in the mapping population found to be in the range of 0.05-2.40%. Recombinant Inbred Lines (RILs), 9 F₁s and 11 mapping populations viz., BY 64 x Banket A1 (F₈/ F₇), VA 510 x Banket A1 (F₈), HDBRG x BY 53 (F₇), HDBRG x GT-7 (F₈), TI 163 x A-145 (F₈/ F₇), Candelx Nisnicotinony 121(F₈), Kumkumathri x Nisnicotinony 121 (F₈), Nisnicotinony 121 x Kumkumathri (F₈), A 145 x GT 7 (F₉/ F₈), GT 7 xA 145 (F₈) and A 145 x Jayalakshmi-WS (F₈) (a total of around 2200 plants) were raised and selfed seed collected. Haploid plants developed from 9 crosses and the efforts are on to develop dihaploid lines through mid-vein culture and colchicine treatment. A total no. of 24 dihaploid lines were developed from six crosses and were maintained.

Action point :

- Approved for continuation of experiments in the ensuing season.

MB 9: Evaluation of advanced breeding lines for yield and quality

In a replicated trial for the first year, out of thirteen lines tested, RS 22, RS 23, RS 24 and RS 32 recorded significantly higher cured leaf yields (3062-3128 kg/ha), than the better control, Siri. The range of yield increase in these lines over Siri is 19-22% in cured leaf. In the twenty white and two black seed breeding lines and five germplasm lines assessed for seed oil content, the oil content ranged from 35.44% to 41.48%.

Out of fourteen entries tested at CTRI RS, Jeelugumilli along with check Kanchan, clones, NLCR-1-9-2-13, VLCR-12-15-14-5, NLCR-9-2 and Pasidi Kanchan P2 recorded significantly higher (23-32 %) cured leaf yield (2327 to 2501 kg/ha) over control, Kanchan. Entries Tobios-2, Tobios-6, Tobios-7 & NM and JS-117 recorded 4-21% higher cured leaf yields than Kanchan. In the analysis conducted by ITC-ILTD Ltd., advanced breeding line, JS-117 recorded lower tar (22.8 mg/cigarette) and CO (10.9 mg/cigarette) values than Kanchan (24.1 and 11.0, respectively) in on-farm trial (2012-13).

The nicotine content in the air cured samples of 94 tobacco varieties ranged from 0.33% in Gandakbahar to 3.53% in HD-65-40 and chlorides from 1.23% in Lichchavi to 4.29% in Hemti. Average nicotine content is low in cheroot (0.91%) and high in hookah and chewing (2.17%). Average chlorides found to be low in *bidi* (1.9%) and high in hookah and chewing (3.12%). Out of fifteen SSR markers used for finger printing five pipeline varieties viz., Tobios-2, JS-117, NLST-4, TBST-2, and YB-4, two popular varieties Kanchan and Banket A1, and a germplasm accession, 324C, primers, NSTM-12, PT-51706, PT-53418, TBM-36 and TM-10163 were found polymorphic.

Action point :

- Approved for continuation of experiments in the ensuing season.

Dr. P. V. Venugopala Rao, Sr. Scientist presented the data of seed production section along with the results of the projects viz., Br 2(a) XII and Br 6 conducted at ICAR-CTRI, Rajahmundry and By Br 1.2 conducted at BTRC, Kalavacharla.

Seed production section

During 2013, **14,897** kg foundation seed of seven different varieties was sold to farmers through CTRI, Rajahmundry and its Research Stations and an amount of **Rs.1,48,97,000/-** was realized.

Br.2: Evolving superior varieties of FCV tobacco through hybridization

Sub project Br 2(a) XI: Evaluation of advanced breeding lines for yield and quality:

A replicated yield trial was conducted for the first Year with ten advanced breeding lines viz., V-5047, V-5050, V-5051, V-5057, V-5058, V-5059, V-5060, V-5061, V-5063 and V-5068 and two controls viz., VT-1158 and Siri. Based on the performance during 2013-14 V-5058 (CLY 2650 kg/ha) and V-5057 (CLY 2517 kg/ha) are better performers among the entries evaluated and the yield improvement over the Siri ranged from 10 to 25%.

Action point :

- Approved for continuation of experiments in the ensuing season.

Br.6: Incorporation of disease resistance for tobacco mosaic virus (TMV)

Black shank resistance incorporation in the recently released variety Siri and the advanced breeding lines N-98 and Cy-142 are in progress. These lines were crossed with the resistant donors Beinhart 1000-1 and 1129SR.

Ten TMV resistant lines viz., VT-1158, JM/2/4, L-1358, L-1359, L-1366, L-1416, L-1417, L-1419 and twelve *Natu* TMV resistant *Natu* tobacco lines PVM 1 to 12 were maintained under artificial inoculation. During 2013-14, 524 progenies were evaluated under artificial inoculation with the pathogen.

Action point :

- Approved for continuation of experiments in the ensuing season.

By Br-1.2: Evaluation of advanced burley breeding lines for productivity and quality

Progeny row trial was conducted involving 51 progenies and ten selections made (YB-26 to YB-35) and these will be evaluated in a replicated trial during 2014-15 to 2016-17. One hundred and twenty one germplasm lines ByGP-1 to ByGP-121 were planted and selected plants are selfed and seed collected for further maintenance. The BC₈ crosses involving the male sterile hybrids BRK-1, BRK-2, TN-97, NCBH-127 and NC-3 were raised and back crossed with the respective male fertile recurrent parent viz., Banket A1, Burley-21, VA-510, Banket-127. The seed was collected.

Action point :

- Approved for continuation of the project.

Dr. K. Prabhakara Rao presented the results of the experiments Biotech-9 and Biotech-10 conducted during 2013-14.

Biotech-9: Transcript profiling and identification of candidate genes resistant to damping-off in tobacco

Sequencing of ITS regions of 17 *Pythium* isolates collected from different tobacco nursery regions was carried out. Among four housing keeping genes (Rbcs, EF-1 α , L25 and tubA1) screened for their expression in *Pythium* infected tobacco genotypes at different time intervals, Rbcs and EF-1 α showed relatively stable expression in stress condition. Defense related genes viz., NtSIPK, Ntf4 and NtMEK2, PR1a, PAL1 and Glunse showed differential expression pattern in control and *Pythium* infected samples.

Action point :

- The project was extended for one more year and approved to carryout NGS profiling.

Biotech-10: Molecular characterization and cataloguing of genus *Nicotiana* using DNA barcoding

Among 3 plant barcode loci screening in selective *Nicotiana* accessions, trnH-psbA showed higher amplicon length polymorphism and rbcL and matK loci recorded lower length variation. Nineteen *Nicotiana* species were amplified with trnH -psbA primer and amplicons were sequenced.

Action point :

- Approved for continuation of experiments in the ensuing season.

ICAR-CTRI Research Station, Guntur

Dr. P. Venkateswarulu, Head in charge, ICAR-CTRI research Station, Guntur presented the results of experiments Br.15 and GS.1 conducted during 2013-14.

Br.15: Development of high yielding FCV varieties suitable for cultivation in SBS of Andhra Pradesh

Eight FCV tobacco lines were evaluated for assessing their performance in respect of yield, quality and disease resistance along with two check varieties viz., Hemadri and Siri. Significant difference in all the yield parameters was observed only with the line, RT 42-1 with 2,782 kg cured leaf yield. In another replicated trial 6 advanced lines (obtained from CTRI, Rajahmundry) were evaluated for their yield along with three checks Siri, Hemadri and VT1158. None of the lines found significantly superior in cured leaf yield compared to all the checks.

Action point :

- Approved for continuation of experiments in the ensuing season.

ICAR-CTRI Research Station, Kandukur

Dr. A.R. Panda, Head, CTRI Research Station, Kandukur presented the crop scenario in SLS along with the results of projects K.Br-6 and K.Br-9 conducted during 2013-14.

K Br-6:Breeding FCV tobacco varieties for yield and quality characters under SLS conditions

Three hundred seventeen (317) accessions of FCV Tobacco germplasm were maintained at CTRI RS, Kandukur. Five single plants selections were made from the F₄ progeny rows of different crosses with aphid resistant lines and caterpillar resistant lines.

K Br-9: Evaluation of FCV tobacco lines for yield and quality under SLS conditions

In a replicated yield trial conducted for second year with 10 promising FCV tobacco lines along with three checks under SLS conditions revealed the test entries R-11, R-15, R-20 and R-57 are significantly superior to all check varieties in respect of all yield parameters.

Action point :

- House suggested to concentrate more on drought and wet foot tolerant lines respectively.
- The house approved the continuation of experiments in the ensuing season.

ICAR-CTRI Research Station, Hunsur

Dr. S. S. Srinivas, ACTO, CTRI RS, Hunsur presented the results of the projects BR.19B and Br.12 conducted during 2013-14.

BR.19 B: Development and evaluation of F1 hybrids suitable to Karnataka Light Soil region

Forty five progenies under seventh filial generation derived from the crosses involving Bhavya, Rathna, Kanchan with Coker 371 Gold & NC 89 were grown under progeny row trial and for further studies during the current season. Among the 45 lines twenty two were promising based on the plant type and cured leaf quality. From these three selections of Kanchan and five selections of Rathna with Coker 371G and NC 89 were promoted to 2014-15 replicated trial.

BR.12: Germplasm maintenance

Active stock of around 635 germplasm accessions is maintained. Under the periodical seed multiplication programme, 250 germplasm accessions were regenerated. Male sterile lines of Kanchan and Rathna were maintained and incorporation of male sterility from varied sources into Kanchan, Rathna, Coker 371G, FCH 201, FCH 221 and FCH 222 was carried out.

Action point :

- Approved for continuation of experiments in the ensuing season.

ICAR-CTRI Research Station, Veda sandur

Dr. M. Kumaresan, Principal Scientist & Head-in-charge, ICAR-CTRI RS, Veda sandur presented the information on seed production, meteorological data of the Station, cost of cultivation of cigar and chewing tobacco along with results of projects B.48, B.49, B.50 and G.S.1 conducted during 2013-14.

B.48 : Studies on heterosis in chewing tobacco (*N. tabacum* L.)

Among the ten F7 hybrid selections evaluated in a replicated trial for the third year (drought condition) the hybrid selections HV.2011-4, HV.2011-1 HV.2011-9 HV.2011-7 and HV.2011-2 were numerically superior to the controls Bhagyalakshmi and Abirami recording 1642,1568,1519,1506 and 1432 kg /ha whole leaf yield respectively. In total leaf yield, selections HV.2011-9, HV.2011-4, HV.2011-1 HV.2011-7 and HV.2011-10 were numerically superior to the controls Bhagyalakshmi and Abirami recording 2556, 2407, 2309, 2296 and 2210 kg/ha total leaf yield respectively.

Action point: The project was concluded

B.49: Pedigree Selection in chewing tobacco (*N.tabacum* L.) population with a broad genetic base

Two promising selections viz., HV.2009-3 and HV.2009-5 derived from broad based populations of diallel selective mating series were grown in pre-release bulk trial at CTRI Research Station Farm as well as in two out station centers showed that both the broad based selections performed well at CTRI research station Farm Veda sandur recording cured leaf yield of 2401 and 2363 kg/ha an increase of 5.9 and 4.2 percent respectively against the control variety Abirami (2266 kg/ha). At out station centres in two farmers, field, the broad based selection HV.2009-3 performed well recording mean cured leaf yield of 4053 and kg/ha an increase of 9.0 percent over the control Abirami.

Action point: The project was concluded

B.50: Breeding for high seed and oil yield in tobacco

Sixty six F4 populations of the five promising crosses for high seed yield were grown under 60 cm x 60 cm spacing and selections were made which recorded seed yield ranging from 1600-2500 kg/ha were retained for advancement of generation and further study.

Action points :

- Sangami and I-737 seed has to be send to CTRI, Rajahmundry for testing black shank resistance.
- High harvest index plants must be shared with CTRI, Rajahmundry
- The house approved the continuation of experiments in the ensuing season.

G.S. 1: Evaluation and maintenance of germplasm

Eighty five chewing and 60 cigar and cheroot germplasm accessions were raised and selfed seed collected.

ICAR-CTRI Research Station, Dinhata

Sri S. Mandi, Scientist, Head-in-charge presented the results of projects B-17, OB-2, DBP1 and B-1 conducted during 2013-14.

B-17: Diallel analysis in *Motihari (N. rustica)* tobacco for breeding superior varieties

The pedigree selections, C-25 x Snuff-2 and B.Q x DD- 437 along with interse-cross, (B.Q x Manda) x (B.Q x Manda) showed significant superiority over all three checks viz. Dharla, DD-437 and Torsa.

OB-2: Improvement of Assam tobacco variety of *Motihari* tobacco (*N.rustica*) for yield by keeping the quality

The three selections (Bengthulisada x Torsa S-1, Bengthulisada x Torsa S-2 and Bengthulisada x Torsa S-3) recorded significantly superior cured leaf yield over checks viz. Bitri and Bengthuli Sada. However, none of the three selections were superior over check Torsa for first grade leaf yield. In all the selections, quality leaf outturn ranged from 32-42 % which is lower than check Torsa and at par with check Bitri.

Action point :

- The project was concluded.

DBP1: Screening for resistance against brown spot and hollow stalk in germplasm accessions of *Jati* (*N. tabacum*) & *Motihari* (*N. rustica*) tobacco in North Bengal

Screening for resistance to hollow stalk under artificial conditions was carried out in sick plot zone for six crosses. The crosses Bengthuli x DD-437 and Bengthuli x Torsa exhibited disease reaction 3.96 cm and 5.03 cm respectively found less reaction as compared to rest of the treatments. Two crosses viz. Bengthuli x White Pathar and White Pathar x Torsa measured up to 12.8 and 11.9 cm, respectively was maximum and treated as susceptible.

Action point:

- The project was concluded

B-1: Collection, evaluation and maintenance of *Jati*, *Motihari*, Cigar Wrapper & filler tobacco germplasm

A total of 70 lines of *N. tabacum* (*Jati*) and 185 lines of *N.rustica* (*Motihari*) tobacco were raised and selfed seeds of each line were collected.

Action point :

- The house approved the continuation of experiment in the ensuing season.

In the end while concluding the session, Dr. R. Lakshminarayana, Chairman of the Technical Session-1, Crop Improvement complimented the Director and Scientists for the work done and elegance in presentations. He opined that priority should be given in exploiting the specific traits like wet foot tolerance, drought and wilt particularly for substations. He insisted for precise statistical data analysis and inclusions of chemical data for ABLs and RYTs. He suggested to go for CMS hybrids instead of fertile hybrids wherever possible.

VARIETY RELEASE PROPOSAL

1. JS 117

Dr. K. Sarala, Principal Scientist, ICAR-CTRI, Rajahmundry presented the release proposal of low tar FCV tobacco variety JS117. There was detailed discussion about the performance of this proposed variety along with yield, chemical and smoke parameters. Since it consistently delivers low tar compared to check variety Kanchan, the line was identified by the IRC for release.

TECHNICAL SESSION II: CROP PRODUCTION, AKMU, AG, EXTENSION & KVK

Date: 04.09.2014

Chairman : Dr. E. Narayana
Rapporteur: Dr. S.V. Krishna Reddy

ICAR-CTRI, Rajahmundry

Dr. C. Chandrasekhara Rao, Principal Scientist and Head i/c presented the major research programmes, action taken report, highlights and ongoing projects of Agronomy experiments conducted at Rajahmundry and sub-stations.

A 80 (a) : Investigations on coir pith utilization in tobacco seedling production

During 2013-14, efforts were made to standardize different parameters for tray seedling production. In this experiment he presented the effect of different media on seed germination, seedling growth, growth curve of seedlings, optimization of seed rate for seed germination, different fertilizers for seed growth.

Action point:

- The house suggested to conclude the project.

A80 (B) : Investigations on coir pith utilisation in tobacco curing.

Briquettes prepared with coir waste alone and coir waste briquettes + saw dust briquettes were compared with wood. Results revealed that both of them were better than wood in terms Kg/kg cured leaf and cost/Kg cured leaf.

Action point :

- The chairman suggested to explore the feasibility of using natural gas as a source of fuel in barn heating for FCV tobacco curing.
- The project was concluded

AB 30 : Evaluation of set row planting in burley tobacco for efficient resource conservation and utilization

Field experiments were conducted at BTRC Kalavacharla to study the effect of set row planting on yield and quality of burley tobacco (Variety Banket A1). The experiment was vitiated due to unfavourable season.

Action point :

- The experiment will be continued.

New Project : 'Investigations on urea as a source of N to FCV tobacco with different combinations of urea with other N fertilizers in NLS of Andhra Pradesh'.

Action point :

- The chairman suggested to change the name as 'Alternative cheaper source of N to FCV tobacco'. He also suggested to use these combinations with organic manures/ green manures to have INM.

Dr.P.Srinivas from ITC suggested for using biofertilizers, fortification of fertilizers, customized fertilizers for each zone. This is because of the fact that we have to look in long-time perspective, as the fertilizer application will have far reaching consequences. Sri D.Ramachandram suggested to examine the cured leaf quality as urea application may produce brittle leaf.

Dr. Chandrasekhara Rao also presented the use of mechanical transplanter, manual planting tool and implement for inter cultivation.

The chairman suggested to concentrate on mechanical seedling transplanter as it is the need of the day due to scarcity of labour.

Dr. S. Kasturi Krishna, Principal Scientist and I/c BTRC, Kalavacharla presented the results of the experiments conducted during 2013-14 season.

A-83 : Chemical management of *Orobanche* in FCV tobacco

Application of chemicals reduced the *Orobanche* weight viz. Neemcake application by 49.4%, A/S spray by 47%, Neem oil by 82.8%, soybean oil by 83.4% when compared to control without reducing the yield of tobacco.

Action point :

- The house suggested to work out the economics of neem cake application
- Test the combination of neem cake @ 10 g/plant and neem oil for effective control of *Orobanche*
- Suggested to test the new chemicals for effective control of *Orobanche*.

A-85 : Leaf biomass improvement in advanced breeding lines for alternative uses

Line RT 46-1 recorded significantly higher nicotine of 95.44 and 88.02 kg/ha with a spacing of 80 cm X 40 cm at 150:75:75 and 100:50:50 doses respectively followed by cross TI-163 X A-145. Line TI-163 X A-145, recorded significantly higher solanesol of 64.26 and 60.26 kg/ha at 150:75:75 fertiliser dose with a spacing of 70X 40 and 80X40 cm, respectively followed by line RT 51-1and HDBRG. Line TI-163 X A-145, recorded significantly higher protein yield of 1247 kg/ha at 150:75:75 fertiliser dose with a spacing of 70 X 40 cm.

Action point :

- The project will be continued during 2014-15 season.

AB-31: Effect of fertiliser source of nutrients on yield and quality of burley tobacco grown in uplands

Sources of fertiliser did not show any significant effect on burley leaf yield and quality. However, higher cured leaf yield was observed when CAN along with DAP in first dose and ammonium sulphate in 2nd dose was applied to burley tobacco.

Action point :

- The project will be continued during 2014-15 season.

Dr. S.V. Krishna Reddy, Principal Scientist presented the results of the experiments conducted at Jeelugumilli.

JLA-37 : Effect of drip irrigation and tray seedlings on the productivity of NLS tobacco

The treatment consisting of drip irrigation, tray seedlings, drip fertigation at 3rd, 20-25 and 40-45 days increased green leaf yield by 3224 kg (22.7%), cured leaf yield by 367 kg (15.5%) and grade index by 409 kg (22.2%) when compared with Furrow irrigation, normal seedlings, soil application of fertilizers at 10, 25-30 and 40-45 DAP.

Action point :

- The project will be continued during 2014-15 season

JLA-38(1): Effect of nitrogen and topping on yield and quality of ABL NLST-3 and NLST-4

ABL NLST-4 with a nitrogen dose of 115 kg N/ha and topping at 26 leaves performed better and gave significantly higher yields than NLST-3 and control cv. Kanchan in irrigated Alfisols under NLS conditions

JLA-38(2): Effect of nitrogen and topping on yield and quality of ABL ABL JS-117

Low tar ABL JS 117 with a nitrogen dose of 115 kg N/ha and topping at 26 leaves performed on a par with control cv. Kanchan with regard to green leaf yield and cured leaf yield under irrigated Alfisols.

JLA-38(3): Effect of spacing, nitrogen and topping on yield and quality of hybrid NLSH-1

CMS hybrid NLSH 1 required a spacing of 100 X 60 cm with a nitrogen dose of 120 kg N/ha and topping at 26 leaves

Action point :

- The project is concluded and pooled analysis to be done.

A-84 : Studies on false maturity and its mitigation strategies in FCV tobacco growing zones of Andhra Pradesh

Field survey for occurrence of false maturity was conducted during crop growing season in the tobacco growing regions of Andhra Pradesh and the possible reasons were delineated.

The chairman suggested to test the different causes for false ripening /forced ripening /fast ripening in the farm level by taking larger bulk plots with few treatments in the trial. He also suggested not to include too many factors in one trail as it may result in inconclusive results. He also advised to come out of apprehensive and old beliefs. He informed that glycel BT cotton is producing almost the same quantum of yield without intercultivation. There the yield reduction without inter culture is not much. He also suggested to see it in tobacco.

Dr. K. Deo Singh, Former Director suggested that during February, due to high temperatures, false ripening and forced maturity is seen and it is to be tested. Dr. Lakshminarayana suggested to explore the role of varieties in false ripening as previously light cast varieties are grown in SLS area. Afterwards dark cast varieties grown and to some extent false ripening was not observed in those varieties.

Action point :

- Field bulk plot studies will be conducted at Black Soil Research Farm, Katheru with three varieties siri, VT-1158 and ABLTBST-2; INM practices and intercultural operations/ weed control measures. Bulk plot studies at CTRI RS, Jeelugumilli will be conducted with INM, irrigation water management, weed control and sucker control measures.

Dr. P.Srinivas, ITC Ltd- ABD ILTD presented the problems of forced ripening and lack of barn space for curing, loss of the yield produced due to different quata of leaf coming to harvesting as a result of rains etc. He emphasized the need to have community barns for handling the matured leaf in curing. He classified the reasons uncontrollable (RF) and controllable (decline in soil fertility nutrient supply system, sucker control, harvesting and curing). Dr. Deo Singh explained that the weather is not controllable and we have to depend on the erratic climate. Now-a-days weather forecasts are possible and we have to plan according to the forecasts. The chairman informed about the weather forecast for the next five days are being sent through SMS to 5000 progressive farmers in RARS, LAM farm area. The forecasts are being carried out with help of IMD.

ICAR-CTRI Research Station, Hunsur

Dr. M. Mahadevaswamy, Principal Scientist presented the results of agronomy experiments conducted at the CTRI RS, Hunsur.

A.38 : Feasibility of producing organic tobacco in KLS

The 3rd year study indicated that the reduction in the productivity of the organic tobacco was 33.0% compared to the reduction of cured leaf to an extent of more than 50% and 42.7% observed in the first and second crop season respectively.

Action point :

- In the studies on organic farming, it was proposed to work out the uptake studies of nitrogen. The project will be continued during 2014-15 season.

A.40 : Potassium nutrition management strategies for productivity and quality enhancement of FCV tobacco grown under rain fed environment in KLS

Application of K @ 100 kg/ha (in 4 splits) recorded the maximum seedling vigour, seedling growth as well as dry matter production followed by K @ 75 kg/ha (in 3 split applications).

Action point :

- The project will be continued during 2014-15 season.

A. 41 : Studies on climate risk management in FCV tobacco based cropping systems in STZ of Karnataka

The study indicated that in 45 % of the years under study, the climate especially the rainfall is not conducive for normal productivity and quality of the crop where mitigation or management is required to reduce the loss in productivity/quality. The co-efficient of variation (C.V. %) was 19.8 %.

Action Point:

- In the studies on the 'Climate change', it was suggested to work out relationship /correlation between other climate factors like temperature, RH, sunlight etc on the productivity and quality in KLS. The project will be continued for 2014-15 season.

Development and evaluation of Integrated Farming System model for rainfed eco-system of KLS: The IFS model developed is being demonstrated to several farmers including FCV tobacco growers for its sustainability and adoptability by the small & marginal farmers

New Project: Evaluating the alternative nutrient sources to provide balanced nutrition for flue-cured tobacco grown in KLS region

Action Point:

- The house approved the project.
- The experiment will be conducted in farmers field in different agro-climatic locations of FCV tobacco growing areas in KLS.

ICAR-CTRI Research Station, Vendasandur

Dr. M. Kumaresan, Principal Scientist & Head i/c presented the results of the agronomy experiments conducted at Vendasandur.

A 101 : Drip fertigation in chewing tobacco

The project was concluded after three years. The results of the year 2013-14 and pooled data with conclusion was presented. Drip irrigation 100% ETC + 100% RDN was recommended to the chewing tobacco farmers of Tamil Nadu for higher yield, net returns and water use efficiency.

Action point :

- The House suggested to conclude the project.

A 102 : Crop productivity, soil quality and economic returns under chewing tobacco + Annual moringa intercropping system in response to nutrient management

Action point :

- The chairman suggested to work out the Tobacco Equivalent Yield (TEY) after the season of the annual moringa is over.

The Integrated farming system model (IFS) demonstration plot 1.0 ha, maintained at Vendasandur was also presented by him.

ICAR-CTRI Research Station, Dinahata

Sri Sunil Mandi, Scientist & Head i/c presented the results of the experiments conducted during 2013-14 season at the station.

A-10: Permanent manurial trail on *Motihari* tobacco

Data on permanent manurial trial showed that the application of 112 kg N + 112 kg P₂O₅ + 112 kg K₂O ha⁻¹ recorded significantly highest green leaf (18982 kg ha⁻¹), cured leaf (2707 kg ha⁻¹) and first grade leaf (1555 kg ha⁻¹) yields of *Motihari* tobacco as compared to control with only FYM @10q ha⁻¹. The percent of recovery of first

grade leaf was highest in NPK (57.44%) followed by NK (53.45%), N P (45.51%) and N (45.4%) applied plots.

Action point :

- Dr. D. Damodar Reddy as CO-PI in A-10 was approved by the House.

A-71 : Optimisation dose of N, P, K with spacing in pipe line variety DJ-1 of Jati tobacco

Spacing 75X 75 cm was recorded highest green (7444 kg ha¹) and cured leaf yield (1422 kg ha⁻¹), also recorded at par green and first grade leaf yield with spacing 90 X 75 cm. Treatment 90 X 75 cm recorded highest first grade leaf yield (805 kg ha⁻¹) and quality outturn (61.72 %) of leaf in North Bengal.

Action point: The project was concluded.

Agricultural Extension

Dr. Y. Subbaiah, Principal Scientist and Head i/c Agricultural Extension presented the results of various projects, outreach extension activities conducted under the Agricultural extension.

Ag. Extn. 50: On-farm evaluation of advanced breeding lines in NLS region

The promising ABLs TOBIOS-2 and NLST-4 have clearly showed the superior morphological characters and vigorous growth in the real farm situation

Action Point:

- The project is approved for continuation.

Ag. Extension 51: Front Line Demonstrations and On Farm Demonstrations

Analysis of data showed that the application of Quizalofop-ethyl at 15 and 75 DAP + Intercultures recorded higher BCR i.e 1.42 over hand weeding + Intercultures (1.37).

Ag. Extension 52 : Impact Analysis of CTRI Technologies

During 2013-14, selected the technologies related to NLS, SLS and SBS areas and studied the impact assessment through identified parameters of impact pathway viz., yield, quality and income.

Action Point:

- The chairman suggested to present the results in impact pathway parameters in a reformed format. He also insisted to find out why the technologies not adopted by the farmer, what are the extensional gaps and reasons for the gaps

and how to fill the gaps.

- The project is approved for continuation.

Dr. K. Suman Kalyani, Principal Scientist presented the activities and the programmes related to changing scenario of cropping pattern of AP and also the activities of externally funded DBT project.

Ag.Extn.36 : Situational analysis of tobacco farmers and changing scenario of cropping pattern of A.P.

The farmers opined that there are several constraints arising either from personal or from social environment obstructing them to adopt the technology.

Action point :

- The project was concluded.

Externally funded DBT Project

An externally funded project “Nutritional Security in Tribal areas of East Godavari District of Andhra Pradesh through community based approaches” was conducting.

Dr. H. Ravisankar, Sr. Scientist, AKMU presented the work carried out on the software system for tobacco research.

ARIS-13: Computational Algorithm for micro-RNA prediction in plants

An algorithm has been designed for prediction of miRNA. As a part of the pipeline, software modules for generating RNA secondary structure, structure of RNA in XML format, RNA structure in pictorial view was developed using shell scripting by imposing various constraints. Built-in modules viz., samtools and mfold are used in the scripting for generating RNA secondary structure in graphical form and in XML format. These modules were executed with the representative tobacco genome survey sequences and we could able to retrieve the above structures which are considered as an input for predicting miRNA and the output file was generated which displays good miRNA sequences from the given structure.

Action point :

- The project was concluded.

ARIS-14 : Expert system for dairy cattle management

Software development has been completed with user friendly menus for instant accessing of the information on selected parameters viz., Feeding, Breeding, Diseases, Cattle shed management, Milking, Fodder cultivation and Health

management related to dairy cattle. Knowledge base was created with 55 parameters and is classified into 7 modules. The developed system will allow the user to add/modify / access the information on various parameters related to dairy cattle and the displayed report will be exported to Microsoft word for storing and a hard copy of the same can be taken.

Action point :

- The project was concluded.

He proposed a new project entitled “Tobacco agridaksh: an online expert system” in collaboration with IASRI, New Delhi.

Action point :

- The project is approved.

Krishi Vigyan Kendra, Kalavacharla

Dr. V.S.G.R. Naidu, Programme Coordinator, KVK, Kalavacharla presented the activities that are conducted at KVK Kalavacharla.

Action Point:

- The chairman suggested to include tobacco as one of the components in KVK activities.

Krishi Vigyan Kendra, Kandukur

Dr. LK Prasad, Principal Scientist presented the works initiated at recently started KVK, Kandukur.

Action Point:

- It was suggested that KVK programmes should include tobacco.

Dr.E. Narayana, ADR, Lam Farm, and chairman of the session stressed the need of farm mechanisation and curing of tobacco with natural gas. He also told that if farmers realize higher yield than research farm yield there is need to find out the reasons and suggested to find out alternatives to sucker control. He explained that agronomy is inductive in nature and it is more difficult to arrive at specific recommendations.

In INM- Use of microbial consortium , bio fertilizers, Azospirillum, Azotobactor to supplement 25% of nutrient N is necessary. He also suggested that the extension programmes should be more scientific.

KVK programmes should include programmes on tobacco. He complemented for the nice technical programme and nice presentation by the Scientists. The session ended with the vote of thanks to the chairman.

TECHNICAL SESSION III: CROP PROTECTION (ENTOMOLOGY, PLANT PATHOLOGY & NEMATOLOGY)

Date: 05.09.2014

Chairman : Dr. V. Ramasubbarao
Rapporteur: Dr. G. Raghupathi Rao

The Plant Protection session was started with the welcome address by the Chairman. In total, 16 ongoing projects, 3 concluded projects and 1 new project proposal were discussed thoroughly. Dr. U. Sreedhar, Head, Division of Crop Protection presented the salient findings of research of the Division and the details of projects and staff position. Dr. Sreedhar also presented the experimental results of two ongoing projects and the details are as follows.

E81: Bio efficacy and field evaluation of new insecticides against tobacco pests

i. Evaluation of new insecticides against *Spodoptera litura* in tobacco nurseries:

Emamectin benzoate 0.025% recorded least (6.19%) seedling damage followed by chlorfluazuron 0.03% (7.40) and novoluron 0.01% (7.84). The seedling damage in these three treatments viz., emamectin benzoate 0.025%, chlorfluazuron 0.03% and novaluron 0.01% was on par with each other.

ii. Evaluation of new insecticides against tobacco aphid, *Myzus nicotiana* on FCV tobacco

At 2 DAS flonicamid recorded the lowest aphid population (3.06) followed by pymetrozine and spirotetramet+ imidacloprid (3.58). At 4 DAS all the treatments except spiromesifen recorded cent per cent mortality of the aphids.

iii. Effect of new insecticides on the aphid predators

Flonicamid and pymetrozine were harmless for the larvae of *Xanthogramma scutellare*. Thiamethoxam was slightly harmful and imidacloprid was moderately harmful. In case of the adult syrphids, flonicamid pymetrozine and thiamethoxam were harmless where as imidacloprid was moderately harmful.

iv. Evaluation of new insecticides against tobacco whitefly, *Bemisia tabaci*, on FCV tobacco

At 7 DAIS the population in diafenthiuron (0.77) was on par with that in pymetrozine (0.89) and flonicamid (0.98), it was significantly less than all other treatments at all the other observations. 15 DAI spray, diafenthiuron recorded least population (0.76) followed by pymetrozine (0.93), spiromesifen (1.03) and flonicamid (1.12). At 30 DAI spray diafenthiuron continued to be the most effective with least whitefly population (0.88) followed by pymetrozine (1.03) which was on par with that

in spiromesifen (1.09), flonicamid (1.20) and imidacloprid (1.24). Buprofezin recorded highest population (1.48) and remained on par with thiamethoxam (1.29).

Action point:

- The house has approved for conducting bulk trials on effective new insecticides.

v-. Field efficacy of new insecticides against tobacco caterpillar, *S.litura* on FCV tobacco

Emamectin benzoate 0.025% (0.00%) and chlorfluazuron 0.03% (3.50 %) recorded least per cent number of plants damaged/plot and provided significantly better protection than all other treatments. Novaluron (11.99%) and lufenuron (13.47%) remained on par with each other and gave significantly better protection than medium, 0.05% and lower 0.0075% doses of chlorfluazuron.

2. E83. Management of ground beetle, *Mesomorphus villiger* in FCV tobacco

At 7 DAT least per cent plant mortality (0.00%) was recorded in T2 Seedling rootdip- Imidacloprid 70 AF @ 0.14% before transplanting and T5- T2 + FS of Imidacloprid 200 SL 0.005% 5 DAT. These three treatments gave significantly higher protection than all other treatments.

E.84: Studies on constitutive and induced defense in *Nicotiana* species against herbivory by *Spodoptera litura* and *Helicoverpa armigera* and *Spodoptera exigua*.

The hexane, chloroform and methanol extracts of *N.gossei*, DWFC and *N.trigonophylla* did not show either antifeedant or contact toxicity against the test insect *S.litura*. The dichloromethane leaf surface wash of *N.gossei* proved toxic to the neonate larvae of *S.litura* at 5000 ppm concentration. The insects died mostly because of gumming of mouth parts and inability to move on the treated surface. The DCM wash of leaf of DWFC and *N.trigonophylla* did not have similar effect on the test insect.

Action point:

- The house approved for discontinuation of the project as Dr. J.V. Prasad, Principal Investigator has been transferred to Hyderabad .

Dr. G. Raghupathi Rao, Sr. Scientist presented the results of one ongoing project conducted by him.

E.82: Evaluation of insecticidal application technology for effective spray coverage in FCV tobacco of NLS region

Application of spray fluid at 50 DAP, through Hi tech sprayer @ 550 cc/min was superior over compression sprayer (Farmers method) in terms of providing uniform coverage, reduced quantity of insecticide (36 per cent) and operator's time (43 per cent). At 65 DAP high pressure knapsack sprayer @1200 cc/min, 5.5 to 6 kmph was superior to Hi tech sprayer.

Action point

- The house has suggested to prepare a video on better pesticide application technology.

Dr. S. Gunneswara Rao, Sr. Scientist presented the results of the projects conducted by him.

E 85: Studies on bio- ecology and management of *Helicoverpa armigera* in tobacco as oil seed crop

Due to delayed planting coupled with intermittent and continuous rains, crop could not get normal growth and remained stunted. Within one month from DAT, the plants flowered and resulted in very small inflorescence and subsequently fewer number of capsules (10-20) with little or no infestation of *H.armigera*. Hence the experiment was vitiated in the current season.

Action point:

- The house approved to continue next season 2014-15.

ICAR-CTRI Research Station, Guntur

Dr. P. Venkateswarlu, Principal Scientist presented the results of the research projects conducted by him.

EG14 : Validation of IPM modules against tobacco aphid, *Myzus nictianae* under CBS conditions

Entomopathogenic fungus, *Verticillium lecanii* on tobacco aphid at 0.5% exhibited 34.86% reduction of aphid population on top leaves followed by bio-agent 0.4, 0.3, 0.2 and 0.1% with population reduction of 33.07, 31.0, 27.98 and 20.35%, respectively over control.

Action point:

- In the previous IRC ,the house suggested to modify the title of the EG 14 as “Validation of integrated management of tobacco aphid *Myzus nicotianae* under CBS and SBS condition

EG.15 : Survey for assessment of insect pest incidence on tobacco and tobacco based cropping systems in CBS and SBS

In nurseries, the average infestation of the pest in the entire area was 8.4% in infested fields and overall infestation was 2.8%. Among these two areas surveyed, the infestation of the caterpillar was slightly more in CBS. In planted crop, aphid and caterpillar incidences were slightly more in CBS, whereas, budworm and leaf curl were more in SBS.

Feeler Trial-1: Monitoring of insect pest incidence in different tobacco varieties at CTRI Research Station, Guntur (CBS)

The pest incidence in different varieties revealed that aphid infestation was above ETL and the remaining pests were below ETL.

ICAR-CTRI Research Station, Kandukur

Dr. K.C. Chenchiah, Principal Scientist, presented the results of the ongoing experiments.

EK.14 : Evaluation of FCV germplasm for tolerance to aphid, *Myzus nicotianae* under SLS conditions

Lowest aphid damaged plants (37.7 %) and % aphid damaged leaves were recorded by the test entry R-188. The damage rating was low (1) on R-188 under both natural and artificial conditions.

Action point:

- The test entry, R-188 was approved for yield evaluation trial.

Trial-4: Evaluation of two promising aphid tolerant lines

Test line R-118 was significantly superior to the best check variety, Hema and VT1158 at par with Siri with respect to all the yield parameters and grade index except bright leaf yield. The bright leaf yield of R-118 was significantly different from all test varieties.

Trial-5: Evaluation of two promising aphid tolerant lines

Test line R-148 and R-149 are significantly different from Hema and VT-1158 and at par with Siri with respect to all the yield parameters except Grade index. It is superior to all the check varieties in case of grade index.

Action point:

- The project was concluded

EK.15 : Evaluation of FCV germplasm for the tobacco caterpillar tolerance under SLS conditions

Test line R-188, R-193, R-68 and R-176 were less damaged and were selected for yield evaluation trial.

Action point:

- The project was concluded

Trial-4: Evaluation of two promising caterpillar tolerant lines for yield (Pooled analysis)

Test line R-130 was significantly superior to the best check variety, Hema with respect to all the yield parameters and at par with Siri with respect to all the yield parameters except grade index.

Trial-5: Evaluation of two promising caterpillar tolerant lines

Test line R-148 was significantly superior to the best check variety Hema and VT-1158 and at par with Siri with respect to all the yield parameters except grade index.

The test line, R-148 recorded low damage rating for caterpillar.

EK.18 : Management of *Bemisia tabaci* in FCV tobacco (Pooled analysis)

Main plot Jowar influenced all the yield parameters significantly in getting higher yields when compared to non-Jowar yields. The sub plot treatment, NSKS 5% spray + Spirotetramat and Imidocloprid spray differed significantly to all the other treatments and gave higher yields.

Action point:

- The study is concluded.

Plant Pathology

Dr. S.K. Dam, Sr. Technical Officer, CTRI, Rajahmundry presented the results of the trials.

PP 79: Efficacy of new fungicides for the management of Frog eye spot disease in tobacco caused by *Cercospora nicotianae*

Application of pyraclostrobin + metiram and carbendazim sprays were superior to the rest of the fungicide treatments in suppressing the PDI (21.00 and 21.43), respectively.

In vitro test indicated that carbendazim was the most effective as it checked 100% growth of fungus even at all concentration and followed by pyraclostrobin + metiram at 500 ppm, propiconazole and kresoxim methyl at 1000 ppm concentrations, respectively.

Feeler trial: Efficacy of new fungicides for the management of leaf blight disease in tobacco nursery caused by *Phytophthora parasitica f.sp. nicotianae*

Fenamidone + mancozeb (100%) followed by metalaxyl + mancozeb (91.23%), pyraclostrobin + metiram (87.65%), copper oxychloride (81.67%), azoxystrobin (79.67%), trifloxystrobin + tebuconazole (70.91%) and kresoxim methyl (62.55%) showed minimum disease index. Whereas, Fenamidone + mancozeb showed 100% disease reduction as compared to control followed by metalaxyl + mancozeb 91% (positive check).

Action point:

- The same feeler trial was proposed as a regular project under the No.PP.79, which was accepted by the house.

ICAR-CTRI Research Station, Dinhat

Sri Sunil Mandi, Scientist presented the results of the Plant Pathology experiments.

PP-12 : IDM of hollow stalk of *Motihari* tobacco in *terai* region of West Bengal

Bio inoculant recorded less disease infected followed by Immuno-modulant and Kocide.

Action Point:

- The house suggested to conclude the project.

PP-10 : Weather based disease prediction model for brown spot of *Motihari* tobacco under North Bengal conditions

Area under infection in leaf as influenced by temperature and relative humidity cumulative for both micro and macro-weather variable has been presented. Maximum area under infection was recorded in temperature range of 12 - 18 °C whereas for RH it was in between 70 - 90%.

Action Point:

- The house suggested to conclude the project.

DBP-1 : Screening for resistance against brown spot and hollow stalk disease in germplasm accessions of *N.rustica* and *N. tabacum* in North Bengal (DBP)

Disease reaction in the crosses Bengthuli x DD-437 and Bengthuli x Torsa exhibited less reaction 3.96 cm and 5.03 cm, respectively compared with rest of the treatments. Two crosses viz. Bengthuli x White Patharand, White Pathar x Torsa measured up to 12.8 and 11.9 cm, respectively was maximum and were treated as susceptible.

Action point:

- The project was concluded.

Nematology

ICAR-CTRI Research Station, Hunsur

Dr. S. Ramakrishnan, Sr. Scientist presented the results of the ongoing projects.

N.1.1 : Survey for Plant parasitic nematodes associated with tobacco

Meloidogyne spp, *Rotylenchulus reniformis*, *Helcotylenchus spp*, *Pratylenchus spp* and *Tylenchus sp*, were associated with main field tobacco crop. Maximum mean population of root knot nematodes were found in Periyapatna region followed by Hunsur, Arkalgud and H.D.Kote. Severe galls with attached egg masses were found in crop infected with root knot nematodes.

P.3.2 :Screening for tobacco germplasm against root knot nematodes

FCR-15, FCR-16, FCR-21, FCR-22, FCI-14 and NLST 4 recorded RKI of ≤ 1.0 and were found most promising against root-knot nematodes.

Action point:

- The house approved for intensive screening under artificial inoculated conditions for further confirmation.

N.20 : Integrated management of root knot nematodes and soil born fungal diseases in FCV tobacco nursery

Integrated application of *Trichoderma viride* & *Paecilomyces lilacinus*, *Trichoderma viride* and *Pochania chlamydosporia* along with ridomil and furadon in solarised nursery beds were on par with each other in recording 40.5 and 41.3 per cent increased healthy seedling count compared to check.

N.21 : Evaluation of bio agents enriched tray seedlings against root knot nematodes and *Fusarium* wilt disease complex in FCV tobacco field crop.

T.viride (50 g) + *P.lilacinus* (50 g) enriched tray seedlings, *T.viride* (50 g) + *P. chlamydosporia* (50 g) enriched tray seedlings and *T. viride* (30 g) + *P.lilacinus* (30g) + *P. chlamydosporia* (30 g) were on par with each other in increasing the cured leaf yield by 9.33, 11.7 and 11.8 percent respectively over check. These effective treatments also decreased the root knot index by 48.4, 48.7 and 52.5 per cent respective and decreased the wilt disease incidence by 52.8, 53.6 and 51.0 per cent respectively over check.

TECHNICAL SESSION - IV: CROP CHEMISTRY AND SOIL SCIENCE

Date: 05.08.2014

Chairman: Dr. B.V. Ramakrishnayya
Rapporteur: Ms. J. Poorna Bindu

The session started with the introductory remarks of Chairman Dr. B. V. Ramakrishnayya, Former Head, Division of Crop Chemistry & Soil Science CTRI, Rajahmundry. Chairman made brief remarks about the activities of Crop Chemistry & Soil Science division and started the session.

ICAR-CTRI, Rajahmundry

Dr. D. Damodar Reddy, Head Crop Chemistry & Soil Science presented the activities and staff position and number of ongoing and new projects of the Division. He highlighted the salient findings of work done by different scientists of the division. He also highlighted the huge amount of resource generation by way of providing analytical services to the various clients.

SS 31: Evaluation of Crop Residue and Wood Ashes - Effects on Soil Fertility and Potassium Nutrition of Tobacco

- Addition of biomass ashes to an acid soil caused a sharp rise in soil pH over the no-ash control. The increments in soil pH were larger with the increase in ash application rate and tended to decrease with the progress of incubation time. The magnitude of increase in soil pH followed the order: PSA > CSA > TSA > EWA.
- Addition of biomass ashes brought of a marked change in K fertility of soil, with magnitude of increase being consistent with K concentration of biomass ashes. Irrespective of ash type, increasing rates of ash addition resulted in greater increase in K availability. Among the biomass ashes, the increase in K availability followed the order: CSA > TAS > PSA > EWA.
- In a field experiment at Hunsur, application of crop residue/wood ashes from tobacco stems, cotton stems, pigeon pea stems and eucalyptus wood (barn ashes) either alone or in combination with SOP (50% + 50%) on 100 kg K ha⁻¹ equivalent basis caused a significant increase in leaf yield of tobacco. Effects of biomass ashes alone or their combinations with SOP on crop productivity were comparable with that of SOP alone. Among the biomass ashes, the CSA proved relatively more effective source of K supplementation. The leaf quality was not affected by the biomass ash treatments.

The chairman expressed happiness and complimented the scientist for good work on importance of biomass ashes as potassium supplement. It was suggested to look into the uptake of other nutrients and their use efficiency in relation to biomass ashes. Project investigator has requested for permission of the house to repeat the incubation experiments to have little modification in the rates of biomass addition for incubation studies. Relatively lower rates i.e. 0.05, 0.1, and 0.15% in place of present

0.1, 0.2 and 0.4% would be used to assess effects of biomass ashes on dynamics of soil acidity and fertility and the proposal has been approved by the house.

Action point :

- The project has been approved for continuation.

Dr. M. Anuradha, Principle Scientist presented the experimental results of the Projects phy-76 and 77.

Phy-76: Impact of excess water stress and adaptive strategies to minimize its negative effects on productivity and quality of tobacco

Mitigation measures to alleviate the effects of excess water stress in flue-cured tobacco

Among the nutrients/growth harmones/poylamines tested KNO_3 soil application in combination with kinetin spray @ 50 ppm twice at 10 days interval could mitigate the ill effects of excess water to some extent in flue-cured tobacco. However, Dr. Anuradha informed the house that treatments should be tested under real waterlogging situation. She presented the summary of the results of project.

Action point :

- The Project is concluded.

Phy- 77: Secondary nutrient deficiency effects on tobacco nutrition

Under no potassium condition the plant growth is less and omission of secondary nutrients didn't show any effect as the K deficiency symptoms masked the effects of secondary nutrients in flue-cured tobacco. Under sufficient K supplied condition omission of single and multiple nutrients showed visual deficiency symptoms, reduction in plant growth and showed variation in uptake of nutrients.

Action point:

- Approved for continuation of experiments in the subsequent season.

Dr. D. V. Subhashini, Principal Scientist presented the results of project SSMB 11

SSMB 11: Development of bio consortia for optimizing nutrient supplementation through microbes for tobacco crop production

Inoculation with the mixture of PGPR (N, P and K mobilizers) at 75% RDF produced significantly superior yield better than the full fertility rate without inoculants. The results suggest PGPR based inoculants can be used and should be further evaluated as components of integrated nutrient management strategies.

Action point:

- The Project is concluded.

Genotype dependant variation in arbuscular mycorrhizal colonization of tobacco (*Nicotiana tabacum* L.)

AM fungi are quite common in all the 54 FCV and non-FCV tobacco genotypes examined, with species of *Glomus* found to be dominant in most of the genotypes grown in vertisols. Tobacco grown in vertisols was investigated for endophytic mycoflora as a possible source of bioprotection to the host against insect pests, pathogens and even domestic herbivores. A total of 9 fungal species viz. *Aspergillus flavus*, *A. niger*, *Aspergillus sp*, *Pencillium sp*. were isolated. Among endophytic flora, *Aspergillus* was the most prominent genus. Actinomycetes can be isolated as endophytes not only inside tobacco roots but also inside tobacco leaves.

Dr. K. Sivaraju, Principal Scientist presented the results of the projects BC-8 and OC-24.

BC-8: Electrophoretic characterization of tobacco - DNA finger printing of ruling tobacco cultivars

DNA fingerprints were developed for popularly grown Flue-cured Virginia (FCV) tobacco cultivars and one Burley tobacco variety using SSR and ISSR markers. Twenty six SSR markers, distributed at least one marker on each of 24 chromosomes were used for development of DNA fingerprints of the varieties. Out of 26 SSR markers, primers PT 10861, PT10694, PT11215, PT 10023 and ISSR primer UBC 863 gave reproducible DNA finger prints. SSR marker TM10023 gave specific marker to variety N98

Action point:

- The project was concluded

OC 24: Studies on chemical constituents responsible for smoke flavor in tobacco grown under different agro-climatic zones

Higher levels of neutral volatiles aroma compounds were observed in organically grown burley tobacco (25% N in the form of organics) when compared to inorganically grown burley tobacco (120 kg N/ha). Neutral volatile aroma compounds, fatty acid and organic acid composition in oriental tobacco were analysed. Top position leaves showed higher levels of neutral volatile aroma compounds. Twelve pigment compounds including degraded pigment metabolites were identified in burley, oriental and FCV tobacco. Pigment degraded products are less in FCV tobacco

Chairman complimented the scientist for his good work and Dr. C. V. Narasimha Rao, Retired Scientist suggested that solenesol and neophytidene concentration may be checked.

Action Point:

- The project is approved for continuation.

ICAR-CTRI RS, Kandukur

Dr. L.K. Prasad, Sr. Scientist (Soil Chemistry), ICAR-CTRI RS, Kandukur presented the results of the projects conducted during the year.

SK- 1: Investigations on soil fertility and ground water quality in SLS and SBS regions of Andhra Pradesh

- Mandal level soil fertility thematic maps were prepared for Kandukur and tangutur mandals. Soil organic carbon content in Kandukur mandal is low in 80% of the area followed by medium.
- Spatial variation of soil available potassium content in Kandukur mandal indicated that 60% area is in high range and 30% area is in medium range. While, in Tangutur mandal 50% area is under medium range, 43% area is in high range and 7% area is in very high range.
- Irrigation water quality indexes were developed for Tangutur mandal and using WQI values GIS spatial maps were developed. Irrigation water was classified and most of the irrigation water is in moderately suitable class and followed by class of conjunctive use.

Action Point:

- The project is concluded.

SK- 2: Assessment of leaf quality of FCV tobacco using hyper-spectral remote sensing and growth parameters

- Preliminary studies on hyper spectral reflectance and leaf quality assessment of FCV tobacco showed that, hyper spectral reflectance of FCV tobacco leaves under different nitrogen levels (reflectance values; 0.05-0.238) has inverse relation with estimated total leaf chlorophyll (0.753-3.103 mg/g), chlorophyll a, b and applied nitrogen with a correlation coefficient ($r=-0.72\pm 0.03$). Sensitivity analysis of hyper spectral bands showed that specific sensitive bands observed for nicotine and reducing sugars.

Action Point:

- The project is approved for continuation.

ICAR-CTRI RS, Jeelugumilli

Dr. K. Nageswararao, Principal Scientist presented the results of projects JL Phy-1 and JL Phy-2.

JLPhy-1: Assessment of topping response of FCV tobacco varieties and advanced breeding lines in NLS

NLST-4, NLSH1 and A3 are on par and gave significantly higher green leaf yield, cured leaf yield and grade index compared to other varieties JS117, LV6 and LV7.

Levels of topping (20, 22 and 24 leaves) did not affect the yield characters.

Action Point:

- The Project is concluded.

JLPhy-2: Maize as an alternative crop to FCV tobacco in NLS

During Rabi season maize crop generated a gross income of Rs. 75996/- and net income of 21,736/- per hectare. In comparison FCV tobacco crop generated a gross income of Rs. 2,20,400/- and net income of Rs. 21,585/- by taking into account only variable costs of production.

Action point:

- The project is concluded.

Dr. D. V. Subhashini proposed a new project “*Nicotiana tabacum* Leaf and stem assisted green synthesis of silver nanoparticles and evaluation of its antimicrobial activity against Agricultural plant pathogens” the objectives include to Prepare *Nicotiana tabacum* Leaf and Stem Extracts, Synthesis of Silver Nanoparticles by Using *Nicotiana tabacum* Leaf and Stem Extracts and Characterization Studies.

Action point :

- There was a thorough discussion on the project and suggested to synthesize the nano particles during the first year. The characterization may be taken up after successful synthesis of silver nano particles in the subsequent years. Dr. C. V. Narasimha Rao, Retired Scientist suggested that apart from green synthesis of nanoparticles of tobacco, nano particles can be prepared with nicotine sulphate directly to use them against insect pests and pathogens.

Ms J. Poorna Bindu proposed a new project on “Evaluation of organic and inorganic soil amendments to minimize nutrient leaching losses and enhance nutrient use efficiency under NLS tobacco production system” with the objectives to quantify the nutrient leaching losses from soils amended with organic and inorganic ameliorants and to evaluate the effects of organic and inorganic amendments on nutrient use efficiency of FCV tobacco under NLS condition.

Action point

The project has been approved.

The session concluded after the appreciations and remarks from the Chairman, Dr.B.V. Ramakrishnayya on the work done by the scientists of the division and centres.

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