

**CENTRAL TOBACCO RESEARCH INSTITUTE,  
RAJAHMUNDRY – 533 105**

**PROCEEDINGS OF INSTITUTE RESEARCH COMMITTEE MEETINGS – 2013  
INAUGURAL SESSION**

**Date : 01.08.2013**

**Chairman : T.G.K. Murthy  
Rapporteur: Dr. J.V. Prasad**

The Inaugural Session of IRC-2013 started with the invitation and welcome by Dr. Y. Subbaiah, Principal Scientist, CTRI, Rajahmundry to all the guests and participants. Dr. K.D. Singh, Former Director, CTRI was Chief Guest of the Session. Dr. C.C.S Rao, Secretary, IRC welcomed the delegates and introduced the purpose and agenda of IRC. He mentioned the latest developments in project monitoring evaluation viz., Results Framework Document (RFD) and formation of Innovation Cell at CTRI.

Dr. T.G.K. Murthy, Director-Acting, CTRI and Chairman, IRC addressed the gathering and presented the salient research findings of 2012-13 crop season. He stated about the new varieties released viz., FCH-222, a *Fusarium* wilt resistant variety for Karnataka, Abirami (CR) and Kamatchi, the caterpillar resistant chewing tobacco varieties for Tamil Nadu during 2012-13. He apprised the audience of the varieties in pipeline like YB-4 (Burley), JS-117 (the low tar FCV variety) , TBST-2 (Aphid tolerant, TMV resistant FCV variety), Tobios -2 and NLST-2 the FCV tobacco varieties for NLS region. He mentioned about the approval in principle of the Network Research Project on value addition to tobacco phyto-chemicals. He told that a Research Project funded by DBT on Nutritional security of tribal women in the tribal belt of East Godavari district has been underway with Dr. Suman Kalyani as the Principal Investigator. He said the EFC XII Plan document and the Vision-2050 document were prepared and submitted to ICAR. He informed that low productivity in KLS and SLS, mechanization and improvement of curing technology for higher fuel use efficiency, besides reducing harmful substances in leaf are the challenges in tobacco research to be addressed on priority.

Dr. K.D. Singh, former Director, CTRI in his inaugural address, emphasized the need to re-orient research programs of CTRI so as to achieve more economic benefits to tobacco farmers. He said issues like consumer health, environmental issues, product integrity, product traceability, health of workers to be borne in mind while formulating research projects. He highlighted the need to reduce harmful substances in tobacco like TSNA, tar and pesticide residues. He felt the need to develop hybrids for increasing productivity and development of varieties resistant to biotic and abiotic stresses. Three new Scientist who joined CTRI recently, two in Agronomy and one in Soil Science were introduced to the house.

This was followed by Scientist – Trade Interface with the members of trade voicing their opinion on certain issues. Dr. M. Mani, Chief Scientist, M/s. ITC Ltd – ABD- ILTD said there is a need to formulate a specific action plan to bring down pesticide residues in tobacco. He told, sometimes importers ask for information on the presence of heavy metals in Indian tobacco. He said the time and conditions of storage of burley tobacco need to be modified to bring down TSNA levels. He emphasized the need to evolve varieties with low levels of harmful substances in them. He said there is a need to develop varieties that give high proportion of good grades so that trade need not depend on additives which have restricted use and also to make use of lower grades of tobacco. He felt the need to manage plant geometry, fertilizer use and topping to meet the customer requirements. Micro-zone specific agronomic recommendations are the need of the hour. He opined that the procedure for the release of new varieties may be shortened to facilitate deployment or restricted release of varieties to meet the international demand as the existing procedure is very time consuming. When asked his opinion on exploiting the alternative uses of tobacco, Dr. Mani said ITC would contemplate starting a business venture on seed oil after ensuring its profitability.

Dr. M. Prabhakara Rao of GPI shared his views on the global tobacco scenario. He said with the downward production trend in Brazil, Zimbabwe and Tanzania, tobacco appears to be a choice crop in India which will ensure good net returns. He said there is a good demand for NLS and KLS tobacco and there is a good scope for burley of Vinukonda area. He felt the need for a high yielding variety to improve productivity of SLS. He said the customers demand a nicotine level of around 3 % in light soil burley. This is to be achieved without enhancing the levels of TSNA. Dr. T.G.K. Murthy requested Dr. Prabhakara Rao to supply few samples of Malawi burley to study its quality parameters.

Mr. P. Guravaiah, Agronomist, Alliance One Tobacco Ltd., Guntur addressed the gathering and emphasized the need for sustainable tobacco production and supply. He felt the need to enhance the productivity, reduce cost of cultivation and address environmental issues and also residues of CPAs. He said there is a need to study green tobacco sickness in FCV and non-FCV cultivation. He remarked that issues like carbon emissions, emission of green house gases from barns and NTRM are to be dealt with. He felt the need to enhance the nicotine content in HDBRG to around 3 to 3.5 % to boost business. This was followed by the address of Mr. Suresh from VST, Guntur.

The Session was concluded with vote of thanks proposed by Dr. Damodar Reddy, Head, Division of Crop Chem. & Soil Science, CTRI, Rajahmundry.

## TECHNICAL SESSION I: CROP IMPROVEMENT

Date : 01.08.2013

Chairman : Dr.R. Lakshminarayana  
Co-Chairman : Dr.K.V. Sitaramaiah  
Rapporteur : Dr. K. Prabhakara Rao

The Session started with introductory remarks of Dr. T. G. K. Murthy, Director- Acting, CTRI and Dr. R. Lakshminarayana, Chairman and former Project Co-ordinator, AINRPT, CTRI Rajahmundry followed by Dr. K.V. Sitaramaiah, Co-Chairman and Associate Dean, Agricultural college, Rajahmundry.

### CTRI, Rajahmundry

Dr. T. G. K. Murthy, Head, Division of Crop Improvement explained the activities and research highlights of the division. He informed that during the season FCV tobacco line, TBST-2 and low tar line, JS117 exhibited superiority in bulk trials and also mentioned the lines which performed well in other trials. He briefed the achievements of seed production section. Later, he also presented the results of the projects handled at Rajahmundry and Jeelugumilli during the season.

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

During the season, 202 *bidi* and 3 *rustica* germplasm accessions were added to the germplasm bank, thereby increasing the CTRI genetic resources to 3167. A total of 1992 germplasm lines comprising 511 flue-cured Virginia, 880 non-FCV lines and 601 elite lines were maintained. Also, 213 accessions of 56 wild *Nicotiana* species and two sub-species were maintained in pots/ experimental micro plots. Eleven non-flowering accessions were rescued through *in-vitro* micro propagation. A total number of 215 accessions of both wild and cultivated *Nicotiana* species were supplied to 20 different researchers/organizations. Two ALP primers targeting the subunits of ATP synthases gene that differentiate CMS and fertile lines were identified and validated in 28 CMS lines and their 19 fertile counter parts. One barcoding primer, trnH-psbA was identified to distinguish wild *Nicotiana* species. Lines tolerant to stem borer (By 16 and By 30) and water logging (Virginia Gold, CTRI Special, Hema, Banket A-1, GT-8, A-145, Bhagyalakshmi and Podali (*Jati*) were identified.

#### **Br.7: Developing hybrid tobacco suitable for traditional black soils of Andhra Pradesh**

In a replicated yield trial with CMS hybrids, eight hybrids were showed significantly higher standard heterosis than Siri at different yield traits. Four of them viz., TBSH-79, TBSH-81, TBSH-87 and TBSH-91 showed 20% or more standard heterosis over Siri. In another replicated yield trial four hybrids viz., TBSH-99, TBSH-96, TBSH-101 and TBSH-98 showed significant standard heterosis over the high yielding check, Siri for all the four leaf yield traits. A total of 63 CMS lines with varying cytoplasm sources were maintained.

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

In five replicated yield trials conducted for three seasons (2010-13) with 56 FCV aphid resistant/ tolerant advanced interspecific cross derivatives, entries TBST-36, TBST-33, TBST-41, TBST-32, TBST-51, TBST-53, TBST-57, TBST-60, TBST-61, TBST-62, TBST-73, TBST-71, TBST-68, TBST-70, TBST-72, TBST-67, TBST-75 and TBST-85 found promising with 7 to 40% higher mean cured leaf yield over check, Siri. The superior lines will be included in AINRPT multi-location trials. Among 12 'Lanka' type advanced interspecific cross derivatives evaluated during 2010-13, two entries viz., LK4 and LK8 exhibited significantly superior performance over check, Lanka Special with 11-19% increase in cured leaf yield. In two replicated trials conducted (2012-13) with 24 FCV aphid resistant/ tolerant inter-specific advanced cross derivatives, 14 lines viz., TBST-93, TBST-94, TBST-91, TBST-97, TBST-98, TBST-90, TBST-92, TBST-99, TBST-89, TBST-88, TBST-107, TBST-105, TBST-109 and TBST-100 found promising with 14 to 46% higher cured leaf yield over check, Siri. Advanced breeding line TBST-2 showed superiority over check varieties at Rajahmundry, Guntur and Kandukur in multilocation trials.

#### Action point

- The house suggested for the coordinated visit of traders to the experimental plots during the crop season to observe the desirable plant types and subsequent assessment of cured leaf.

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

Preliminary evaluation of advanced breeding lines and different replicated yield trials were conducted. Lines, SM26-1, ABL8-1, ABL10-1, ABL13-1, RT31-1, RT19-1, RT18-1, RT30-1, F3-18-1, F3-20-2, RT57-1, F3-15-1, RT30-1, RT36-1, RT6-1, RT51-2, RT62-1, RT67-3, F3-9-1, RT9-1, RT10-1, RT27-1, RT29-1, RT29-2 and RT33-1, RT66-1, RT91-1, RT92-1, RT94-1 RT108-1 recorded higher yield than control. In bulk assessment trial with five entries viz., Tobios-2, NLST-3, NLST-4, NLSH-1 and Kanchan (check) all the test cultures showed desirable plant type and physical leaf quality. They recorded 2 to 15% more leaf yield than check variety, Kanchan.

#### Action point

- Approved for continuation of experiment in the ensuing season.

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

Among The 16 CMS hybrids, two hybrids MSH-1 and MSH-15 showed significant standard heterosis (22 & 34) 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 experiment in the ensuing season.

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

In the bulk evaluation trial, Sel 47, Sel 45, and 45-90 were found promising with 12, 13 and 9% increase in cured leaf yield over Kommugudem (1475 kg/ha). In a replicated trial with sixteen lines, ten lines (NF3-5-1, NF3-6-2, NF3-8-1, NF3-10-2, NF3-11-1, NF3-12-1, NF3-12-2, NF3-15-1, NF3-20-2, and PVM8-1) showed significantly higher total cured leaf yield (42 to 96%) than check, Kommugudem. Based on aroma, colour, leaf size, leaf blemish and weight, expert farmers identified the lines viz., NF3-5-1, NF3-6-2, NF3-12-2 and NF3-15-1 along with Kommugudem suitable for irrigated condition.

### Action point

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

Dr. A.V.S.R. Swamy, Principal scientist proposed a new project entitled 'Developing tobacco cultivars for high seed yield, oil content, high biomass and other phytochemicals.

### Action point

- The project was discussed thoroughly and approved.

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) X and Br 6 conducted at CTRI, Rajahmundry and By.Br 1.2 conducted at BTRC, Kalavacharla. An amount of Rs.1,35,92,500/- was realized through seed sale

## **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:**

Results of combined analysis based on the performance of the selections over three years revealed that the selections V-5000, V-4998, V- 4999 and V-5003 are significantly superior over check and will be proposed for testing under AINRPT.

### Action point

- Approved for continuation of experiments in the ensuing season.

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

Ten TMV resistant lines viz., VT-1158, JMR, HMR, 1099/2/4, L-1358, L-1359, L-1366, L-1416, L-1417 and L-1419, Twelve *natu* TMV resistant *natu* tobacco lines PVM 1 to 12 were maintained under artificial inoculation. Black shank resistance incorporation in 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. During 2012-13, 667 progenies were evaluated under artificial inoculation with the pathogen and data were recorded on all the plants in each progeny. Based on the susceptibility and the plant type

103 progenies were rejected and the remaining will be tested under artificial inoculation during 2013-14.

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**

The combined analysis of replicated trials conducted with fourteen advanced breeding lines (YB-15 to YB-25) along with three controls viz., Banket A1, Burley-21 and Swetha revealed significant cured leaf yield in YB-19, YB-22, YB-23, YB-20 and YB-21. YB-19 recorded higher cured leaf yield of 1660 kg/ha, followed by YB-22 (11597 kg/ha) with an improvement of 46 and 40 per cent respectively over better control Banket A1 (1139 kg/ha). The range of improvement over Banket A1 was 9 to 46 per cent. Evaluation of segregating material was carried out in a progeny row trial involving 30 progenies and selections were made. In order to incorporate male sterility in burley varieties, the BC<sub>8</sub> 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 and Banket-127.

Action point

- Approved for continuation of experiment in the ensuing season.

Dr. K. Sarala, Principal Scientist presented the results of the experiments, Cy 7(iii), Biotech-6 and MB9 conducted during 2012-13.

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

A total of 571 plantlets of various tobacco entries were micropropagated under *in vitro* during 2012-13.

Action point

- Approved for continuation in the ensuing season.

### **Biotech 6: Molecular mapping of important tobacco traits**

Nine out of 20 SSR markers tested found polymorphic among the parents of RIL populations of nicotine and solanesol. Fourteen SSR markers found polymorphic among the parents and bulks of RIL populations related to nicotine and solanesol. DNA isolated from 258 lines from solanesol mapping population (HDBRG x BY 53 cross derivatives) and 249 nicotine mapping population (Candel x Nisnicotinony-121 cross derivatives) for further analysis. Nicotine in the mapping population is in the range of 0.18-2.96%. Out of 247 entries analyzed in the mapping population was highest population found to be in the range of 0.6-1.0% and 1.0-1.5% nicotine range. Generation advancement of 11 mapping population was carried out and 24 dihaploid lines were developed from six crosses were maintained.

Action point

- Approved for continuation of experiment in the ensuing season.

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

Four somaclones and nine advanced breeding lines were tested in a replicated trial for three years and based on the combined analysis, the lines RS-13, RS-16, RS-17, RS-18 and RS-19 are considered for promoting to multi-location testing under AINRPT. Entries VLCR-1-12-K, VLCR-5-10, VTCMV-1-P8, VTCMV-1-6-8, RS-12, RS-13, RS-14, RS-15, RS-17, RS-18 and RS-19 found to be resistant to TMV under artificial inoculation.

Out of 20 promising Kanchan somaclones and 12 VT-1158 somaclones tested for black shank reaction under artificial conditions at Katheru Farm, all the plants inoculated in 13 clones are found to be free from black shank infection. Two transgenics, each of Hema and Jayasri; and two transplastomic lines having Cry 9 Aa2 gene under Petit Havana background were maintained in transgenic screen house.

In a replicated trial at CTRI RS, Jeelugumilli with twelve somaclones and two breeding lines, Clones NLCR-1-9-2-13, NLCR-7-11-1-4, NLCR-BT1-P2, NLCR-BT2-P9, VLCR-12-15-14-5 and NLCR-9-2 recorded significantly higher yields of all types than Kanchan.

Action point

- Approved for continuation of experiment in the ensuing season.

Dr. K. Prabhakara Rao, Scientist presented the results of the experiment Biotech-9 conducted during 2012-13 and proposed a new project entitled 'Molecular characterization and cataloguing of genus *Nicotiana* using DNA barcoding.

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

Molecular characterization of four pathogen isolates causing damping off was carried out. The ITS (Internally Transcribed Sequence) gene regions comprising ITS1, 5.8S and ITS2 were amplified, sequenced and deposited in NCBI. Among the twenty one selected tobacco genotypes screened under natural and artificial conditions with *Pythium aphanidermatum*, Coker 1 was found to be highly susceptible and GT-9, GT-5 recorded reduced mycelia growth.

Action point

- The new project on 'Molecular characterization and cataloguing of genus *Nicotiana* using DNA barcoding' was discussed thoroughly and approved

### **CTRI Research Station, Guntur**

Dr. C. Nanda, Scientist, CTRI Research Station, Hunsur presented the results of experiments Br.15 and GS.1 conducted during 2012-13

### **Br.15: Development of high yielding TMV resistant FCV varieties suitable for cultivation in Andhra Pradesh**

In a replicated yield trial 6 entries (obtained from CTRI, Rajahmundry) along with two checks evaluated for their yield potential and it was found to be

non significant. Twenty eight crosses involving eight superior lines (Siri, Hemadri, VT 1158, TBST-2, TBST 17, FCG 2, FCG 3 and V 4278) were made in half diallel pattern and F<sub>1</sub> seed collected for evaluation in next season. In a FCV bulk trial with new pipe line varieties SH-1 and TBST-2 out yielded the check Siri by 7%, cured leaf yield and this was followed by SH-1. In On-farm evaluation, yield was recorded in case of TBST 2 (2223 kg/ha) as compared to check Siri (1950kg/ha) with 12.3% improvement.

Action point

- Approved for continuation of experiments in the ensuing season.

### **GS .1: Germplasm Maintenance**

Nine caterpillar resistant Natu lines (NG 54, NG 55, NG 58, NG 59, NG 60, NG 61, NG 65, NG 66 and DWFC) and five released varieties (Prabhat, Vishwanath, WAF, NATU Special, Bhairavi (NG 73)) were grown for seed regeneration. Seven CMS lines received from Rajahmundry were maintained by crossing to their maintainers.

Action point

- Approved for continuation of experiments in the ensuing season.

### **CTRI Research Station, Kandukur**

Dr. K.C.Chenchaiah, Senior Scientist, 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 2012-13.

#### **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 plant selections were made for aphid resistance and caterpillar resistance individually in separate progeny rows. Three breeding lines from CTRI RS, Kandukur viz., FC-1 a dwarf variant of Siri with smaller internodes identified from the bulk population of Siri.

Action point

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

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

In a replicated yield trial conducted with 10 promising advanced breeding lines along with three checks under SLS conditions revealed the test entries; FC-1, R-11, R-15, R-20 and R-57 were significantly superior to all check varieties for the yield parameters.

Action point

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



## **CTRI Research Station, Hunsur**

Dr. C. Nanda, Scientist, CTRI Research Station, Hunsur, presented the results of the projects BR.19A and Br.12 conducted during 2012-13.

### **BR.19 A: Development and evaluation of advanced breeding lines suitable to Karnataka Light Soil region**

Eight advanced breeding lines developed from the crosses involving Kanchan, Rathna, Newdel, NC 12, PCT 8 and yellow spl were evaluated in 2011-12 and 2012-13. None of the entries showed any superiority over Kanchan. Forty five progenies under 6<sup>th</sup> filial generation derived from the crosses involving Bhavya, Rathna, Kanchan with Coker 371 Gold & NC 89 were grown under progeny row trial and advanced to seventh generation for further studies.

Action point

- Approved for continuation of experiments in the ensuing season.

### **BR.12: Germplasm maintenance**

A total number of 635 germplasm accessions were maintained. Under the periodical seed multiplication programme, 250 germplasm accessions were regenerated. Male sterile lines of Kanchan and Rathna were also maintained and incorporation of male sterility from varied sources into Kanchan, Rathna, Coker 371G, FCH201, FCH221 and FCH 222 continued.

Action point

- The house suggested for microzone classification for Mysore and other similar tobacco growing areas for their suitability to grow semiflavourful tobaccos

## **CTRI Research Station, Vedasandur**

Dr. M. Kumaresan, Head I/c, CTRI Research Station, Vedasandur 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 2012-13.

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

Ten F<sub>6</sub> populations of promising hybrids (HV.2011-1 to HV.2011-10) were grown in a replicated yield trial along with Bhagyalakshmi and Abirami as controls for assessing their quality and yield. In the combined analysis for two years (2011-13), selections HV.2011-2 and HV.2011-1 recorded cured leaf of 4265 and 4099 kg/ha, respectively. Selections HV.2011-5, HV.2011-7 and HV.2011-9 were significantly superior to the control variety, Bhagyalakshmi recording 3994, 3864 and 3722 kg/ha total leaf yield, respectively., Selection HV.2011-2 recorded maximum chewing quality score of 74.0 out of 80 is followed by HV.2011-1(72.5/80.0). The trial will be conducted in the ensuing season for confirmation of results.

Action point

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

#### **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 four out station centers viz., Semmadaipatty, Olagampatty, Kulipatty and Reddiarchatiram along with the control variety, Abirami for assessment of yield and quality. Both the broad based selections HV.2009-3 and HV.2009-5 performed well at station farm (with 13.1 and 5.0%) and four out station centres (15.9 and 7.4%) with respect to cured leaf yield over the control variety Abirami. The trial will be conducted during 2013-14 also for confirmation of results.

Action point

- The house approved the continuation in the ensuing season.

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

Ninety eight F<sub>3</sub> populations of the promising crosses were grown under 60 x 60cm spacing and selections having seed yield ranging from 1250 – 2200 kg ha were retained for advancement of generation and further study.

Action point

- The house approved the continuation in the ensuing season.

#### **G.S.1: Evaluation and maintenance of germplasm**

As a regular programme, 85 chewing and 60 cigar and cheroot germplasm accessions were maintained. Cytoplasmic male sterile lines of Bhagyalakshmi, Abirami, Maragadam, PV-7, I-115, and VR-2 were crossed with their respective fertile counterparts for maintenance.

Action point

- Approved for continuation in the ensuing season.

#### **CTRI Research Station, Dinhata**

Dr. T. G. K. Murthy, Director-acting presented the results of projects B-17, B-19, B-1, OB-2 and DBP1 conducted during 2012-13.

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

The pedigree selections (T<sub>1</sub>-T<sub>3</sub>), interse- crosses (T<sub>4</sub>) and inter-mating crosses (T<sub>5</sub>-T<sub>6</sub>) recorded significantly superior cured leaf yield over check, DD-437. Pedigree selection from cross C-25 x Snuff-2 showed significant superiority over check Torsa whereas Black Queen (B.Q) x DD-437 exhibited significant superiority over all the three checks viz. DD-437, Dharla and Torsa. In all the selections, quality leaf outturn ranged from 46-51% and is at par with two checks, Dharla and DD-437. The experiment will be continued in the crop season 2013-14 for further evaluation.

Action point

- The house approved the continuation in the ensuing season.

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

Among the 5 crosses tried in a bulk plot trial, three crosses (Bengthuli sada x Torsa S-1 , Bengthuli sada x Torsa S-2 & Bengthuli sada x Torsa S-3) recorded 400-1000 kg/ha more cured leaf yield over the local check, Bitri and over and at par yield with check, Torsa. All the crosses recorded about 2.5 - 4 times more yield than the Assam variety Bengthuli and Bengthuli sada. Considering the higher cured leaf yield and first grade leaf yield, these crosses may be tested/promoted to conduct replicated trial.

Action point

- The house approved the continuation in the ensuing season.

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

In *N. tabacum* among the accessions tested, four accessions viz. II- 4a-7-86, II – 1a – 7-80, Vaishali special and GT- 7 proved to be highly resistant as the disease reaction was nil. Among six crosses screened for resistance to hollow stalk under artificial conditions in sick plot, the crosses, Bengthuli x DD-437 and Bengthuli x White Pathar exhibited resistant disease reaction. Two new crosses viz. Bengthuli x Torsa and White Pathar x Torsa would be raised in the crop season 2013-14 for testing its reaction to hollow stalk.

Action point

- The house approved the continuation in the ensuing season.

**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 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 in the bulk plot assessments apart from the best line in terms of yield quality and the other better performers can be used as breeding base for the development of lines with higher yield and quality. He suggested for designing more breeding programmes on biotic and abiotic stresses targeting SLS region. Dr. K.V. Sitaramaiah, Co-Chairman of the session expressed his happiness over the research progress and opined that one has to be vigilant in cash crops and design projects keeping in view of international requirements of the crop. The session ended with the vote of thanks proposed by Dr. Subbaiah Principal Scientist.

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

Date: 02.08.2013

Chairman : Dr. R. Veera Raghavaiah

Rapporteur: Dr. M. Mahadevaswamy

At the outset, the Chairman welcomed all the scientists and the participants for the session and the presentation of their scientific works.

### CTRI, Rajahmundry

Dr. C. Chandrasekhara Rao, Head, Division of Crop Production, CTRI, Rajahmundry presented the action taken report of IRC-2012 meet and the same thing was approved by the House. Later, he presented the Research highlights of the different programmes carried out in the Crop Production Division. During the presentation the seed yield and seed oil productivity of other seed oil crops like castor was highlighted for the benefit of the house. He presented the research works carried out in different experiments viz., coir pith utilization for seedling production, Briquettes for curing, set row planting and agro techniques for higher biomass yield to the house.

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

During the season efforts were made to standardize the technology for bulk seedling production in plastic trays using coir pit medium. All the Agronomy experiments and the tobacco germplasm maintenance were supplied with tray seedlings for better establishment. In all the trails gap filling was minimum compared to conventional seedlings with uniform growth. Diseases incidence in the seedling stage is minimum

#### Action point

- The study would be continued for further evaluation of fertiliser doses, different media and seed rate etc.

#### **80(B): Investigations on coir pith utilization in tobacco curing**

During the season the coir waste briquettes alone or in combination with saw dust briquettes were evaluated for curing of tobacco at CTRI Farm. Coir waste briquettes showed good burning capacity compared to coir pith briquettes. Results revealed that waste briquettes alone or in combination with saw dust briquettes can be effectively utilized for curing of tobacco as a substitute for wood/coal.

#### Action point

- To explore the possibility of utilizing agri waste for making briquette making for reducing the cost of briquette manufacturing and also to alter the shape of the briquettes for better burning of the fuel material.

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

The effect of set row planting on the yield and quality of burley tobacco (Variety Blanket A1) was evaluated at BTRC, Kalavacharla. Application of 100% fertilizers through SRP (Set Row Planting) being at par with 75% RDF and conventional method of planting with RDF showed significantly higher green yield and cured leaf yield over 50%, 25% RDF and control and also resulted in highest P and K uptake over 25% RDF and control.

#### Action Point

- It was suggested to have control zero and set line zero to work out the possible saving in the fertilizer quantity

Dr. S. Kasturi Krishna, Principal Scientist presented the results of the experiments conducted under irrigated alfisols on Integrated weed management to the house.

### **JLA-35: A. Integrated weed management (IWM) in FCV tobacco grown under irrigated alfisols**

The prominent weed species were *Dactyloctenium aegyptium*, *Digitaria*, *Panicum*, *Cyperus rotundas*, *Cyperus iria*, *Clome viscose*, *Portulaca oleraceae*, and *Phythium niruri*. All the herbicide application treatments showed statistically lower weed dry matter production at 30 DAT. Among the various herbicides evaluated the weed control efficiency was highest in spaying Quizalofop –ethyl at 60, 75 days, 15+75, 60+90 days and in 75+125 DAT. IWM practices involving Quizalofop–ethyl recorded cured leaf yield on par with that of weed free check with acceptable cured leaf chemistry.

The house felt that the chemical weed control becomes necessary in tobacco due to acute labour problems and also during unfavourable situations.

#### Action Points

- Persistence of herbicides/weedicides in the leaf needs to be studied
- Economics of weed control to be taken into consideration

Dr. Kasturi proposed two new projects for the approval of the house:

#### 1. Integrated Orabanche management in tobacco

Since the *orabanche* is a problem in the area and farmers are facing considerable economic losses in terms of yield and quality due to this menace, the project was approved by the house with the following suggestions.

- It was suggested to concentrate on chemical control management since the effect of trap crops has already been proved.
- The experiment should be conducted in sick field conditions only in both TBS & NLS
- Cured leaf analysis with respect to the weedicides residues/persistence should be done

## 2. Performance of Advanced breeding lines with different plant population for leaf biomass production in vertisols

The new project was approved with the following suggestions:

- Uniform application of organic manures commonly for all the treatments
- The technical programme to be modified with 2 spacings x 2 N levels x 3 Varieties
- The initial soil fertility level be assessed before the commencement of the experiment.

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

### **JLA 38-1: Effect of nitrogen & topping on yield and quality of Advanced Breeding Line NLST-3 and NLST-4**

It could be inferred that ABL NLST-4 performed well and gave significantly higher yield than NLST-3 and also the control Kanchan. A nitrogen dose of 115 kg N/ha and topping at 26 leaves were optimum for both NLST-3 and NLST-4.

#### Action Point

The project is approved for continuation.

#### New Project

A new project "Studies on false maturity and its mitigation strategies in FCV tobacco growing regions of Andhra Pradesh" was proposed.

#### Action point

The project was approved after thorough discussion with the following suggestions:

- The Problem of false maturity and reasons for the same may be identified within short time period
- The help of Tobacco Board may be also be taken to find out the reason for the problem in the area
- Imbalance in the nutrient ratios of the false matured leaf may be studied with other physiological changes.

## **CTRI Research Station, Hunsur**

Dr. M. Mahadevaswamy, Sr. Scientist presented the research highlights of the experiments conducted on Agronomic practices for optimizing the ripeness and yields in FCH 222, organic tobacco production, Potassium x root knot interaction studies and the fuel use efficiency studies in tobacco curing in KLS region.

### **A 37: Agronomic evaluation of promising FCV tobacco varieties**

The block trails conducted revealed that the medium caste varieties like FCH 222 requires topping of 20-22 leaves with optimum N application of 70 kg N/ha for optimizing the ripeness and maximizing the yield and quality under sandy loam situations of KLS.

#### Action Point

- The project would be concluded and RPF III will be submitted

### **A 38: Feasibility of producing organic tobacco in KLS**

The II year study indicated that the productivity of organic tobacco was reduced by 42.3% compared to the reduction of more than 50% observed in the I year of the study. However the bright grade leaf production increased by 10% and the Root knot incidence reduced by 35-40% in fully organic plots. The nicotine levels tend to be markedly lower under the organic treatments compared to the inorganically grown tobacco

#### Action point

- It was suggested to study the initial soil fertility levels as well as the post experiment soil nutrient status after the study. The project would be continued for the third crop season.

### **A39.Effect of graded levels of K on the incidence of Root knot & Potassium uptake pattern of FCV tobacco in KLS**

The confirmatory trials revealed that higher doses of K requirement (180 kg/ha) for maximizing the productivity of both the cured leaf and the top grade equivalent in the root knot affected sandy light textured soils of KLS. The RKI was significantly reduced to an extent of 35-55% by the application of higher doses of K @ 180-240 kg/ha. The quality parameters of the cured leaf were in the normal acceptable range and not affected by the levels of K.

#### Action point

- The project will be concluded and RPF III will be submitted.

## New Projects

Two New project proposals were presented by Dr. Mahadevaswamy.

### 1. Potassium nutrition Management strategies for productivity and quality enhancement in FCV tobacco grown under rainfed environment in KLS

After thorough discussion, the chairman suggested to modify the technical programme as follows:

- Nursery experiment treatments are approved
- Suitably modify the main field treatments to increase the K use efficiency and higher k uptake by the crop for better grade out turn and cured leaf quality.
- The sub-plot treatments K mobilizing bacteria are be deleted

#### Action point

- The project was approved by the house subject to the modifications in the technical programme as suggested above.

### 2. Studies on climate risk management practices for FCV tobacco based cropping system in STZ of Karnataka

#### Action Point

- The project was approved by the house.

## **CTRI Research Station, Vedasandur**

Dr. M. Kumaresan, Sr. Scientist presented the research findings of the chewing tobacco experiments conducted on drip fertigation and tobacco + Annual moringa intercropping systems at Vedasandur.

### **A-101: Drip fertigation in chewing tobacco**

First grade Leaf yield (FGLY) increased significantly by 14% with drip fertigation at 100% RDN over the furrow irrigation. Higher gross and net returns were recorded with the drip irrigation + 100% RDN and drip irrigation + 100% RDN soil applied. However B: C Ratio was higher with furrow irrigation.

Action point: The nutrient distribution curve should be presented to understand the depletion zone in the drip irrigation. The experiment will be continued for one more year.



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

The gross returns were higher with Annual Moringa intercropped with chewing tobacco at 50% population + 125% recommended dose of fertilizer applied to both chewing tobacco and annual moringa. However the net returns and B:C ratio was higher with sole tobacco

#### Action point

- The causes /reasons for the increased tobacco yield in the intercropping system with annual moringa may be studied. The experiment would be continued during 2013-14 season also.

### **BA-54: performance of advanced breeding lines of chewing tobacco grown under different levels of nitrogen**

Nitrogen at the rate of 150 kg/ha would be optimum for the advanced breeding line BSR-1 for higher cured leaf yield, net returns and B:C ratio.

#### Action point

- The experiment would be concluded and RPF III to be submitted.

### **BA-55: performance of broad based selections of chewing tobacco under different levels of spacing and N levels**

The spacing of 90x 75 cm significantly increased the FGLY and TCLY over the wider row spacing of 90 x 90 cm. N at the rate of 125 kg/ha was sufficient for higher FCLY and TCLY. Higher gross returns and net returns were recorded with HV. 2009-3 under the spacing of 90 x 75 cm and N @125 kg/ha.

#### Action Point

- The experiment will be continued for 2013-14 season

### **CTRI Research Station, Dinhata**

The research results of the CTRI Research Station, Dinhata were presented by the Director.

### **A-10: Permanent manorial trail on *Motihari* tobacco**

Application of NPK @ 112 kg/ha recorded significantly higher green, cured leaf and first grade leaf yield of *motihari* tobacco as compared to control with only FYM @ 10 t/ha. The percent of recovery of first grade leaf was highest in NPK (49.7%) followed by NK (45.7%), NP (42.9%) and N (39.5%)

#### Action point

- The spacing and fertilizer N requirement for DJ-1 variety is be worked out.

## **Agricultural Extension**

Dr.Y.Subbaiah, Principal Scientist presented the results of the various project conducted under the Agril. Extension division.

### **Ag.Extn.-48: Critical analysis of resource utilization by FCV Tobacco farmers in NLS and SLS regions**

The mean adoption of identifiable technologies was found to be 78.4 and 48.7 for recognized farmers and other farmers respectively for NLS while the same was 67.6 and 34.4% for SLS. The regression coefficients of all the independent variables explained about 55.1 and 69.4% of total variation in respondent's extent of adoption in NLS and KLS respectively.

#### Action Point

- The project is approved for continuation.

### **Ag.Extn.-49: on farm demonstration of identified alternatives crops to FCV tobacco in Vertiosols of Andhra Pradesh**

The study revealed that the tobacco provided higher net returns from unit of land, though B: C Ratio is more in case of maize and chick pea in vertisols.

#### Action Point

- The project is approved for continuation.

### **Ag.Extn.-50: On-farm Evaluation of Advanced Breeding Lines in NLS Region**

The two years data revealed superior yield in ABL JS-117 to an extent of 23% with perceptible variations in nicotine, sugars and tar content compared to Kanchan. The BCR was also higher in JS-117(1.625) compared to check (1.345).

#### Action points:

- The 'n' (no. of observations or the sample size) should be mentioned
- The farmers' inter-face programmes should be intensified further
- The project is approved for continuation.

Two new project proposals were presented by Dr.Y.Subbaiah to the house.

1. On farm demonstration and Front line demonstration
2. Impact analysis of CTRI Technologies

#### Action Point

- The above projects were approved by the house.

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: Situation Analysis of tobacco farmers and changing scenario of cropping pattern of AP**

Bengal gram (57 %), Black gram (18%), Paddy (6%), Chillies (3.1%) and Eucalyptus (19%) were the other alternative crops in SLS in proportion to tobacco area. By cultivating eucalyptus and subabul the farmers are getting additional income of RS. 10,000 to 15,000 per acre. IN SBS, 43% o the area is occupied by Bengal gram, 11.5% by Maize, 15% by paddy, 7.7% by red gram, 6.9% cotton and 6% by Ground nut in proportion o tobacco. The SBS farmers are taking up other alternative crops (Chick pea and ground nut) in addition to the tobacco without reducing the tobacco area.

Action point

- The project is approved for continuation.

**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 sanctioned by DBT New Delhi for a period of 3 years (2012-2015) to bring a desirable change in the living standard of the tribal population by incorporating the principle of Nutritional security

Action point

- Institution extension activities should be taken up. The project is approved for continuation.

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

**ARIS-12: Decision Support System for Transfer of Technology.**

The software was developed in the form of website where it was classified mainly into two modules ‘Specific to region’ and ‘General’. In ‘Specific-to-region’ module, NLS, NBS, SLS, SBS and KLS regions are considered as sub modules.

Action point

- The information in the web pages was stored and hyperlules were provided to the homepage for accessing. The project was concluded.

### **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. 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.

Action point

- Prediction of MiRNA using these modules is in progress. The Project will be continued.

### **ARIS 14 : Expert system for dairy cattle management**

System analysis for designing the knowledge base has been completed. Information for 55 parameters was collected and they are clustered into 7 modules viz., Feeding, Breeding, Disease, Management, Milking, Cultivation and Health Management. The information for all the parameters was collected and documented. Designing of knowledge base and development of software with user friendly menus for storing and retrieval of the information is in progress.

Action point

- Weather based information should be completed in time. The project will be continued.

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

Date: 03.08.2013

Chairman : Dr. V. Ramasubbarao

Rapporteur: Dr. P. Venkateswarlu

The Plant Protection session was started with the welcome address by the Chairman. In total, 7 ongoing projects, 6 concluded projects and 6 new project proposals were discussed thoroughly. Dr. U. Sreedhar, Head, Division of Crop Protection presented the Action Taken Report on the suggestions of IRC-2012 followed by the salient findings of research of the Division and the details of projects and staff position. He then presented the results of his two concluded projects and one ongoing project which are detailed here under.

### **E.74. Monitoring of insect pests of tobacco with pheromone traps**

The results indicated that with the increase in trap catch there is an increase in the egg masses on seed beds in the following week and subsequent increase in larval population and the damage two weeks after. There was a highly significant and positive correlation between moth catch, incidence of pest and damage in both seed beds and field crop.

Action Point

- The project is concluded.

### **E. 78. Management of tobacco caterpillar, *Spodoptera litura* with insecticide baits**

Emamectin benzoate bait provided maximum protection to tobacco leaves as shown by less number of leaves damaged (1.26 & 1.40) and was followed by novoluron (1.86 & 2.20) and lufenuron (2.10 & 2.50) at 4 and 10 days after treatment. Emamectin benzoate bait treated plots recorded highest cured leaf yield (2339 kg/ha) which was followed by novoluron (2260) and lufenuron (2198). An ICBR of 1:16.28, 1:14.83 and 1:11.48 was recorded with emamectin benzoate, novaluron and lufenuron baits respectively in FCV tobacco (NLS).

Action Point

- The project is concluded.

### **E. 81. Bio-efficacy and field evaluation of new insecticides against tobacco pests**

Chlorfenapyr 10 SC @0.01% metaflumizone 22 SC @0.04% were found effective against *S. litura* in tobacco nurseries and planted crop. Metaflumizone was relatively safe to the egg parasitoid, *Telenomus remes* and larval parasitoid, *Glyptapanteles africanus*. New insecticides flonicamid 50 WG, pymetrozine 50 WG and spirotetramet + imidacloprid 240 SC @ 0.018% effectively controlled tobacco aphid infestation in FCV tobacco. They were relatively safe to the aphid predator, *Chielomenes sexmaculata*.

Action Point

- The project is approved for continuation.

New project

E.83. Management of ground beetle, *Mesomorphus villigera* in FCV tobacco

Action Point :

- The project is approved..

Dr. J.V. Prasad, Principal Scientist presented results of one project conducted by him.

**EG-13: Development of base line resistance data of lepidopteran pests of tobacco against conventional insecticides and insecticides with novel mode of action**

The results showed that lowest LC<sub>50</sub> value was recorded with emamectin benzoate followed by chlorpyrifos, profenophos and quinalphos in both Rajahmundry and Guntur populations. When the base line resistance of *H.armigera* populations from Guntur and Rajahmundry to insecticides with stomach action was compared, Guntur population recorded 1.41, 1.33, 1.08, 33.06, 12.08, 1.41, 1.21 and 1.14 times higher LC<sub>50</sub> values of novaluron, thiodicarb, fipronil, rynaxypyr, acephate, chlorpyrifos, endosulfan and flubendiamide, respectively compared to Rajahmundry populations.

Action Point

- The study is concluded.

New project

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

Action Point

- The project is approved with two modifications. He was asked to reduce the number of genotypes under study and to limit the bio-chemical parameters in induced defence experiments. He was also asked to collect leaf samples very early after infestation to record activity of defensive enzymes.

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

- It was suggested to use filter paper in place of plastic sheet while spraying potassium nitrate to measure pesticide deposit. He was also asked to take more observations (more than 12) in the correlation studies.

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

### **E-80: Studies on *Helicoverpa armigera* in tobacco with special reference to seed production**

Among the three varieties for which age specific life tables were constructed, Kanchan recorded highest life expectancy of 9.52 at the beginning of life table followed by VT-1158 and N-98. A comparison of life parameters revealed that highest net reproductive rate was recorded on Kanchan followed by VT-1158 and N-98. Similar trend was observed in terms of potential fecundity, intrinsic rate of increase, annual rate of increase, mean generation time and weekly multiplication rate. Mean generation time was shortest in N-98 followed by VT-1158 and Kanchan.

#### Action point

- The project is concluded with the following suggestion. As CV values are high in his experiments, he was asked to subject the data with square root transformation.

#### New project

E-85: Bio-ecology and management of *Helicoverpa armigera* in tobacco as seed crop

#### Action Point :

- The project is approved.

## **CTRI Research Station, Kandukur**

Dr. K.C. Chenchiah, Senior Scientist, CTRI RS, Kandukur presented the results of the ongoing experiments.

### **EK.15: Evaluation of FCV tobacco germplasm for the tobacco aphid tolerance under SLS conditions**

The results indicated that the test line, 178-2 was significantly superior to the best check variety, Hema and VT1158 at par with Siri with respect to green leaf, cured leaf yields and grade index. The bright leaf yield of 178-2 was significantly different from Hema but at par with VT-1158 and Siri.

#### Action Point

- The project is approved for continuation.

### **EK.14: Evaluation of FCV germplasm for tolerance to *S. litura***

The results indicate that, the test line 151-2 is significantly superior to the best check variety, Hema with respect to all the yield parameters and at par with Hema in case of grade index. The test line 143-2 was significantly superior to the best check variety, Hema with respect to cured leaf only. All the yield parameters also differed significantly during the two seasons.

#### Action Point

- The project is approved for continuation.

### **EK.18: Management of *Bemisia tabaci* in FCV Tobacco**

The results indicated that the 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

- Dr. Chanchiah was asked to give infestation and insect population data in third project i.e. EK.18. He was also suggested to transform the experimental data with logarithmic values for statistical analysis pertaining to all three ongoing projects.



## **CTRI Research Station, Guntur**

Dr. P. Venkateswarlu, Principal Scientist presented the results of the research projects conducted by him at CTRI RS Hunsur during 2012.

### **EH-01: Survey for assessment of insect pest incidence in KLS tobacco**

The nursery survey indicated that average per cent infestation was more (3.9) in 2008 followed by 2009 (2.0), 2011 (1.2), 2010 (1.0) and 2012 (0.8). Among the five *Taluks* surveyed, Periyapatna recorded more infestation (2.2) followed by Hunsur (2.1), H.D.Kote (1.7), Ramanathpura (1.3) and K.R.Nagar (1.2). The average infestation of caterpillar in KLS tobacco nurseries over five years was 1.8%. Main field survey revealed that aphid infestation was more (2.9%) in the region followed by stem borer (2.4), bud worm (2.1) and caterpillar (0.7). The infestation of aphid was more (8.1%) in 2008, stem borer in 2012 (6.5%) and bud worm in 2010 (3.4%). The survey indicated that caterpillar and aphid are main insect pests of KLS tobacco in nursery and main field, respectively.

#### Action Point

- The project is concluded.

#### New projects

### **EG.14: Validation of IPM module against tobacco aphid, *Myzus nicotianae* under CBS conditions**

#### Action point

- Head, Division of Crop Protection suggested to test the efficacy of fungus, *Verticillium lecanii* in the field under CBS conditions during first year and to implement the project from second year onwards after evaluating the efficacy of fungus. The project was slightly modified with the inclusion of another control module with maize barrier crop.

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

#### Action Point

- The project is approved.

## PLANT PATHOLOGY

Dr. S.K. Dam, Technical Officer, CTRI, Rajahmundry presented the results of one feeler trial.

### **Efficacy of new fungicides for the management of frog eye spot in FCV tobacco**

Results showed that carbendazim followed by azoxystrobin, propiconazole, kresoxym methyl and pyraclostrobin + metiram showed minimum disease index. Whereas, tebuconazole + trifloxystrobin and mancozeb showed only 10.9 and 10.2% disease reduction as compared to control. Carbendazim, azoxystrobin, propiconazole, kresoxym methyl and pyraclostrobin + metiram reduced per cent disease intensity (PDI) more than 75% over control.

#### Action Point

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

## NEMATOLOGY

CTRI Research Station, Hunsur

Dr. S. Ramakrishnan, Sr. Scientist, CTRI RS, Hunsur presented the results of his two ongoing projects conducted during 2012.

### **N.1.1: Survey for plant parasitic nematodes associated with tobacco**

Results indicated that maximum mean population of root knot nematode, *Meloidogyne spp* was found in Periyapatna region (101.3 J<sub>2</sub> per 100g soil) followed by Hunsur (69.0 J<sub>2</sub> per 100g soil), Arkalgud (45.0 J<sub>2</sub> per 100g soil) and H.D.Kote (42.6 J<sub>2</sub> per 100g soil). Reniform nematode, *Rotylenchulus reniformis* was found in large numbers in almost all the soil samples collected in KLS.

#### Action Point

- The project is approved for continuation.

### **P.3.2: Screening of tobacco germplasm against root-knot nematodes**

Results revealed that the following materials viz., FCR-12, FCJ-1, FCJ-8, FCJ-10, and FCH 229 & FCH 231 recorded RKI of  $\leq 1.5$  on 0 – 5 Scale and hence were found most promising against root-knot nematodes under sick field conditions. The promising lines will be further subjected to intensive screening under artificial inoculated conditions for further confirmation.

#### Action Point

- The project is approved for continuation.

Finally, the session was concluded with the following remarks of the Chairman.

- While writing the scientific name of the pest, author name should be mentioned along with family and order names.
- Suggested scientists to collect all the available pests of tobacco and get their scientific identification.

## TECHNICAL SESSION – IV: CROP CHEMISTRY AND SOIL SCIENCE

Date: 03<sup>rd</sup> August, 2013

Chairman : Dr.B.V.Ramakrishnaiah  
Rapporteur: Dr.L.K. Prasad

The Chairman, Dr. B.V.Ramakrishnaiah, Former Head, Crop Chemistry and Soil science, CTRI, Rajahmundry and Co-Chairman, Dr.C.V.Narasimha Rao, Rtd. Principle scientist, CTRI, Rajahmundry. Chairman made brief remarks about the activities of Crop chemistry and Soil science division at CTRI and started the session. There were 8 speakers for the session.

Dr. D. Damodar Reddy, Head, Crop Chemistry and Soil Science had highlighted the division activities and achievements under the major program: *Management of resource constraints for production efficiency and product quality*. He told that based on the suggestions made in last IRC one project was formulated for K enhancement in leaf with ITC. Studies on water stress on tobacco growth and flavor profile in Lanka tobacco were also taken up. He highlighted the salient findings of work done by different scientists of the division.

### **SS31: Evaluation of crop residue and wood ashes - Effects on soil fertility and potassium nutrition of tobacco**

Different plant and wood ashes were characterized and adsorption properties were studied. The results showed that most ashes are highly alkaline with high EC and can be used as liming material. K and Ca can be supplied to the soil through these ashes.

Some members expressed the view that the plant ashes can be activated as activated charcoal and can be enriched with FYM. The chairman asked that how much ash/ha to be applied, on which soil type and is there any loss of inorganic constituents. Dr.D.Damodar Reddy replied that nitrogen is lost up to 98% during the burning of plant wastes. Ash can be used only as a supplement to K fertilizer and suitable for soils with acidic nature (Shimoga soils).

Action point

- This project is approved for continuation.

Dr. M. Anuradha Principal Scientist (Physiology) had presented the results of 2 sub-projects conducted during the year.

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

The results of study with 84 varieties of all tobacco types showed that reduction in all physiological parameters was in tolerant types compared to

susceptible one under excess water stress. In the another experiment it was found that to mitigate the excess water stress Kinitin spary @ 50 ppm + KNO<sub>3</sub> to soil was most affective followed by Putriscine spray.

Action points

- Genotypes should be ranked according to the tolerance.
- The effect of water stress can be studied at different stages and under different submergence periods.
- Photographs of susceptible and tolerant varieties/lines should be given or presented.

**Phy-77: Secondary nutrient deficiency effects on tobacco plant nutrition.**

The results showed that single and multiple nutrient stress reduced the leaf area and biomass in N sufficient conditions but there was no much difference in secondary nutrient deficiency under without N conditions.

The uptake of major and secondary nutrients was reduced under nitrogen stress conditions. Similarly, single and multiple nutrient deficiencies reduced all growth characters and physiological parameters.

Action point

- This project is approved for continuation.

Dr. K. Siva Raju, Principal Scientist (Bio-chemistry) had presented the results of sub-projects conducted during the year.

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

The study identified the compounds that contributed for smoke flavor. The highest content contributed from Neophytidine followed by 3-hydroxysolavetivoene. The results indicated that increase in N fertilizer did not increase the Neophytidine content.

The study identified the aroma compounds in Burley, Oriental and Lanka tobaccos and 40 % were Dutriene compounds.

Action point

- This project is approved for continuation.

**BC-11: Bio-chemical characterization of tobacco seed oil**

The results showed that out of 54 accessions tested, Coker1 showed maximum oil content (41.7%) whereas AR-53 showed the lowest (28%). The

studies on tobacco seed oil as bio-diesel found that the molar ratio of 6:1 with 10 % excess methanol is best at 60° C for 1 h 20 m for complete transesterification of tobacco seed oil.

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

The results indicated that DNA fingerprints were developed with the help of 26 SSR markers for 12 popularly grown FCV tobacco varieties and one Burley tobacco cultivar Blanket-1.

Action point

- An internal standard variety to be included in the study as suggested by the Co-chairman.

This project is approved for continuation.

Dr. R.K. Ghosh, Scientist (Organic Chemistry) had presented results of sub-projects conducted during the year.

#### **PR-1: Monitoring of pesticide residues in tobacco samples from different areas**

A multi residue analysis method was standardized and validated. The present method was based on quantifier-qualifier ions ratio which decreased the chance of false detection as it is not in the case of previous method based on retention time.

The new method was evaluated with samples from tobacco growing regions and results complied with the GRL specifications.

An improved LC/MS/MS method was tested for detection of low dosage pesticide residues. In another study the rapid extraction of solanesol with the help of Isopropanol was developed in which the extraction can be analyzed up to 20 days.

Action point

- The project is approved for continuation.

#### **OC – 10: Evaluation of smoke constituents in tobacco and tobacco products**

A study was done to compare main stream smoke yields of 6 different *bidis* under varietal release program. Results indicated that sample 5 had relatively low TAR, nicotine and carbon monoxide contents.

Action point

- The project is approved for continuation.

## **CTRI Research Station, Jeelugumilli**

Dr. K. Nageswara Rao, Principle Scientist (Plant physiology) & Head, Jeelugumilli, presented results of sub-projects conducted during the period.

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

The results showed that NLST-4 and A-3 varieties had highest yield parameters compared to other five varieties. Topping levels (20, 22 and 24 leaves) did not differ significantly. Interaction effect between varieties and topping levels was not significant. However, topping level of 24 leaves gave highest cured leaf yield.

Action point

- The project is approved for continuation.

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

Maize was tested as alternative crop to tobacco for NLS region with hybrids *Ganga Kaveri* and *Pioneer*. The results showed that application of zinc at the rate of 8.0 kg/ha to maize crop marginally increased the grain yield both in *kharif* and *rabi*. The cost of production of both maize and tobacco crops was calculated and compared.

Action point

- The project is approved for continuation.

Dr. D.V. Subashini, Principal Scientist (Microbiology) presented the results of sub- project conducted during year.

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

The results revealed that among all the treatments inoculation of mixture of plant growth promoting bacteria at 75 % RDF produced significantly superior yield better than full fertility rate without inoculants.

Based on IRC 2012 recommendation a bulk trail was conducted to test the nutrient mobilisers and it was found that 75 % RDF + Azotobacter + B.subtilis + F. auruntia is the best combination of nutrient mobilisers.

The laboratory studies on K solbulising bacteria showed that out of 15 KSB isolates 5 were able to solubulize mica mineral under *invitro* condition.

In another lab study on isolation, characterization and anti microbial activity of streptomycetes spp, it was found that effective in antimicrobial activity and produce 80 % of total antibiotic products and secondary products are having industrial value.

Action point

- The project is approved for continuation.

Dr. C.C.S. Rao, Principal Scientist (Soil science and Agrl.chemistry) presented the results of sub - project conducted during year.

**AgSS-2: Soil fertility investigations: Preparation of soil test summaries, Nutrient Indices and soil fertility maps of Tobacco growing soils of India.**

Soil fertility survey and water quality evaluation of chewing tobacco growing soils of Tamil Nadu was completed. The results indicated that majority of the soils are low in organic carbon. Soil available phosphorus is high in majority of the soils. Except in *Nagapatnam* district the available potassium is high where it was recorded medium. Soil test summaries were prepared and nutrient index values calculated.

Majority of the irrigation waters were saline with high chloride content in the districts under the study.

Action point

- The project is concluded.

CTRI Research Station, Kandukur

Dr. L.K. Prasad, Sr. Scientist (Soil Chemistry) presented the results of the sub-project conducted during the year.

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

The post monsoon water samples of *Tanguturu mandal* and depth wise soil samples of 14 villages were analysed for water quality and soil fertility parameters. The thematic maps of water quality were prepared and compared with pre monsoon water quality. The results showed that there was a decrease in chloride, EC, potassium and sodium concentration after monsoon. There was a negative relationship observed with pH and chloride content. Ground water of high chloride containing area is in below alkaline range. Water quality index map of *Kandukur* mandal was prepared.



Soil fertility and quality spatial maps of different villages of *Tanguturu mandal* were prepared. Surface and sub-surface variation in soil fertility was studied. The mean p

H of the area is 8.11. Organic carbon content of the soils is low. It ranged from 0.19 to 0.38 per cent. The  $\Delta$  O.C is 0.2 % between surface and sub surface soil. Mean value of soil chloride of *Tanguturu* mandal was 121 ppm.

#### Action points

- Water quality index map of Kandukur should be modified according to the ground water quality.
- The Co-investigator Dr.V.Krishnamurthy can be de-associated/replaced with any other interested scientist of the division as project period will be extended.
- The project is approved for one year continuation.

#### New Projects

Two new projects were presented. One from the division of Crop chemistry & Soil science and another from CTRI RS, Kandukur.

#### New Project

Dr. D.V.Subashini, Principal Scientist (Microbiology) proposed the project titled: "Studies on K solubilising bacteria".

#### Action point

- This project proposal is not approved as such. The project concept should be reviewed in the light of practical utility and feasibility and come up with the proposal.

Dr. L.K. Prasad, Sr. Scientist (Soil Chemistry) proposed an inter-institutional collaborative project titled "Assessment of leaf quality of FCV tobacco using hyper-spectral radiometric remote sensing techniques".

#### Action point

- Title should be modified so that it should also reflect the focus on physiological and growth studies.
- Field level observations /survey can be included to get large variability.
- Refinement is needed in the N, P and K dosages in the proposed crop experiment.
- The project proposal is approved.

The session concluded after the appreciations and remarks from the Chairman, Dr.B.V.Ramakrishnaiah and Co-chairman, Dr. C.V. Narasimha Rao on the work done by the scientists of the division and centres.

**Annexure - I**

**NEW PROJECTS APPROVED IN IRC - 2013**

| S.No                    | Project code | ICAR Project code        | Title of the Project   |
|-------------------------|--------------|--------------------------|--|
| <b>CROP IMPROVEMENT</b> |              |                          |  |
| 1                       | Br-8         | P1-2013/01-ITI-F30/2760  | Developing tobacco cultivars for high seed yield, oil content, high biomass and other phytochemicals   |
| 2                       | Biotech-10   | P1-2013/02-ITI-F30/2760  | Molecular characterization and cataloguing of genus <i>Nicotiana</i> using DNA bar-coding  |
| <b>CROP PRODUCTION</b>  |              |                          |  |
| 3                       | A-83         | P1-2013/03-ITI-F27/2760  | Integrated <i>Orabanche</i> management in tobacco  |
| 4                       | A-84         | P1-2013/04-ITI-F27/2760  | Performance of Advanced breeding lines with different plant population for leaf biomass production in vertisols  |
| 5                       | A-85         | P1-2013/05-ITI-F27/2760  | Studies on false maturity and its mitigation strategies in FCV tobacco growing regions of Andhra Pradesh   |
| 6                       | A-40         | P1-2013/06-ITI-F27/2760  | Potassium nutrition Management strategies for productivity and quality enhancement in FCV tobacco grown under rainfed environment in KLS   |
| 7                       | A-41         | P1-2013/07-ITI-F27/2760  | Studies on climate Risk Management practices for FCV tobacco based cropping system in STZ of Karnataka   |
| <b>CROP PROTECTION</b>  |              |                          |  |
| 8                       | E.83.        | P1-2013/08-ITI- H10/2760 | Management of ground beetle, <i>Mesomorpha villigera</i> in FCV tobacco  |
| 9                       | E.84:        | P1-2013/09-ITI- H10/2760 | Studies on constitutive and induced defence in <i>Nicotiana</i> species against herbivory by <i>Spodoptera litura</i> and <i>Helicoverpa armigera</i> and <i>Spodoptera exigua</i> |
| 10                      | E-85:        | P1-2013/10-ITI- H10/2760 | Bio-ecology and management of <i>Helicoverpa armigera</i> in tobacco as seed crop  |

|  |            |                          |   |
|--|------------|--------------------------|---|
| 11                                       | EG.14      | P1-2013/11-ITI- H10/2760 | Validation of IPM module against tobacco aphid, <i>Myzus nicotianae</i> under CBS conditions                |
| 12                                       | EG.15      | P1-2013/12-ITI- H10/2760 | Survey for assessment of insect pest incidence in tobacco and tobacco based cropping systems of CBS and SBS |
| 13                                       | PP-79      | P1-2013/13-ITI- H20/2760 | Efficacy of new fungicides for the management of frog eye spot in FCV tobacco                               |
| <b>CROP CHEMISTRY &amp; SOIL SCIENCE</b> |            |                          |   |
| 14                                       | SSK-1      | P1-2013/14-ITI- F60/2760 | Assessment of leaf quality of FCV tobacco using hyper-spectral radiometric remote sensing techniques        |
| <b>AGRICULTURAL EXTENSION &amp; AKMU</b> |            |                          |   |
| 15                                       | Ag Extn-51 | P1-2013/15-ITI- C00/2760 | On farm demonstration and Front line demonstration  |
| 16                                       | Ag Extn-52 | P1-2013/16-ITI- C00/2760 | Impact analysis of CTRI Technologies  |

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