PULSES NEWSLETTER

Indian Institute of Pulses Research, Kanpur

VOLUME 17, No. 4 XXXXVI OCTOBER-DECEMBER, 2006

CONTENTS

Dr. S. Prakash Tiwari takes over as Dy. Director General (CS)

Dr. S. Prakash Tiwari, Dy. Director General (Education) has assumed the additional charge of Dy. Director General (CS), on December 1, 2006. Born on November 14, 1947, Dr. Tiwari obtained Ph.D. degree in Genetics from IARI, New Delhi. He has meritorious scholastic attainments and rich professional experience as scientist, research manager and planner. Having served as Project Coordinator (Linseed); Director, NRC for Soybean; Assistant Director General (Seeds); ADG (Commercial Crops & Plant Protection), and Director NAARM, Dr. Tiwari has significantly contributed to bring a sea change in the concept of research management. He has provided customized infra-structural and policy support to agricultural R&D both in micro - management and schematic modes. His active role in promoting soybean as a new crop in the country has made soybean a significant pillar of yellow revolution. Dr. Tiwari has been arduously involved in the New Seed Policy formulation, PVP Legislation, Seed Legislation and Task Force on Agricultural Biotechnology.

A renowned scientist and agricultural expert, Dr. Tiwari has visited several countries including USA, UK, Switzerland, Italy, Spain, China, Korea, Mongolia, Philippines, Thailand, Nepal and Bangladesh and represented the country as negotiator/leader in several important international interactions. He has served as Consultant to IPGRI, now called as *Bioversity International*, Rome, Italy and is the Chairman of a Committee of National Biodiversity Authority, Chennai. He is also a Member of the Search Committee for Padma Awards (2006-07), Ministry of Home Affairs. Dr. Tiwari is also Member of Board of Management of several SAUs and Central Agricultural University, Imphal.

IIPR welcomes the new Dy. Director General.

National Farmers' Fair and Agricultural Exhibition Organized

To commemorate the *Kisan Samman Diwas*, the Institute organized National Farmers' Fair and Agricultural Exhibition on December 23, 2006. While inaugurating the event, Prof. Chandrika Prasad, Director General, UPCAR stressed on traditional farming involving crop and animal husbandry as integral parts of agriculture for sustainable production.

On this occasion, *Kisan Samman Samaroah* and *Krishak Goshthi* were also held in which Dr. Ashok Bajpai, Hon'ble Minister of Agriculture, Govt. of U.P., was the Chief Guest. The Hon'ble Minister called upon the scientists for their commitment towards farming community as prosperity of the country can not be achieved without improving their livelihood. This requires active participation of farmers, research institutes and Government. He also emphasized upon the need of ensuring agricultural credit at the lowest possible interest rates in order to make farming a profitable venture. The Hon'ble Minister felicitated five progressive farmers involved in pulses production from three districts of U.P. and also distributed seeds of improved varieties of mungbean for spring cultivation.

The programme was chaired by Shri Balwan Singh, Ex. MLA, U.P. Vidhan Sabha. Shri Singh expressed his concern on the import of wheat and pulses, and called for major governmental interventions for improving the pathetic conditions of the farming community. Dr. Masood Ali, Director highlighted the research accomplishments and other activities of the Institute for the benefit of the farmers and called for adoption of improved pulses production technologies.

A large number of ICAR institutes, SAUs, financial institutions, private firms engaged in manufacturing of agricultural implements and plant protection goods participated in the Farmers' Fair and Agricultural Exhibition. Over 800 farmers from the adjoining districts *viz*. Hamirpur, Kannauj, Raebarely, Fatehpur, Kanpur, Kanpur Dehat and Unnao were benefited from the event.

Project on Pigeonpea Genomics Launched

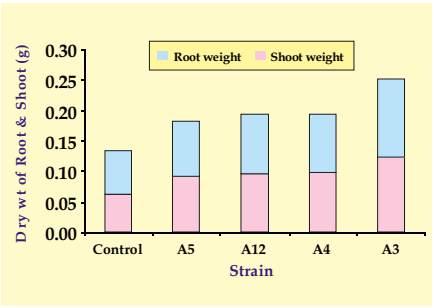
Under the Indo-US Agricultural Knowledge Initiative, ICAR has recently launched a bilateral project on "Pigeonpea genomics initiative" which aims at developing genomics resources like ESTs, markers, BAC library and genetic maps. The project will not only enable generation and validation of SSR and SNP markers, but also high - density molecular map and DNA markers linked to useful traits for molecular breeding application. The project has been approved with a total outlay of Rs. 60 crores for five years. The participating Institutes are NRCPB, New Delhi; IIPR, Kanpur; ICRISAT, Hyderabad; BHU, Varanasi; UAS, Dharwad and PDKV, Akola. IIPR has been given the responsibility to generate EST libraries from two wild species of pigeonpea and development of population for reference map and QTL mapping. The project launch meeting was held at NRCPB, New Delhi on November 10, 2006 which was attended by PIs and detailed technical programme was discussed. A separate meeting was held at IIPR on December 12, 2006 to discuss the modalities for execution of the project.

Plant Growth Promoting Rhizobacteria for Chickpea

Plant-microbes interactions are known to play significant role in nutrient uptake, disease suppression and growth promotion activities. Pulses are known to derive maximum benefits from plant microbes interactions in the form of symbiotic and asymbiotic associations. Besides N-fixation through *Rhizobium* symbiosis, pulses also derive benefits through associations with number of other soil micro-organisms such as *Azotobacter, Azospirillum, Pseudomonas, Bacillus*, *etc*., collectively classified as plant growth promoting rhizobacteria (PGPR). An attempt was made to isolate and develop a consortium of micro-organisms for use as PGPR in chickpea.

Effect of Azotobacter strains on chickpea biomass

Azotobacter strains, isolated from the endo-rhizosphere of various pulse crops were purified and evaluated for their growth promoting effects on chickpea. Among the tested strains of *Azotobacter*, four strains improved chickpea growth with a maximum increase in plant biomass (87%) with Strain A3.

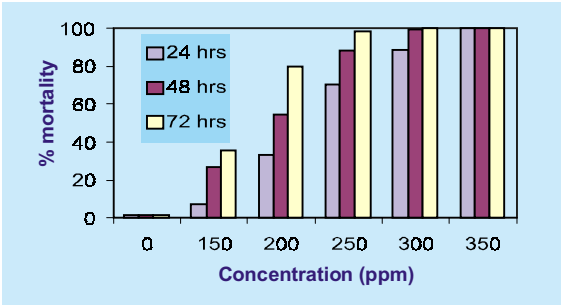


Effect of Azotobacter strains on chickpea biomass

K. Swarnalakshmi, Mohan Singh and R.G. Chaudhary

Nematicidal Properties of Sorghum Root Exudates

Allelochemicals from sorghum roots exudates were extracted and fractionally crystallized into different groups from polar to non-polar. Highly non-polar fraction was emulsified into suitable EC formulation and tested for mortality of juveniles (J_2) of root knot nematode, *Meloidogyne javanica.* Bioassay was done in four replications by taking different dilutions *viz*., 150, 200, 250, 300, and 350 ppm of allelochemicals in 50 mm diameter petri plates. One ml nematode suspension containing approximately 300-400 juveniles was added in each petri plates. Mortality was recorded after 24, 48 and 72 hours. Compound was found extremely toxic to juveniles at all the dilutions tested. The effect was found concentration and time dependent *i.e.*, increase in concentration and time was associated with drastic increase in the mortality of juveniles. After 24 hours of treatment, 100% mortality was recorded at 350 ppm, whereas at 300 ppm, 100% mortality was recorded after 48 hours. Two hundred fifty ppm concentration was also found quite effective giving 100% mortality after 72 hours. At 150 ppm, nearly 40% mortality was observed after 72 hours of treatment. Therefore, based on the above tests, it may be concluded that sorghum root exudates possess some unknown compound having tremendous activity against nematodes.

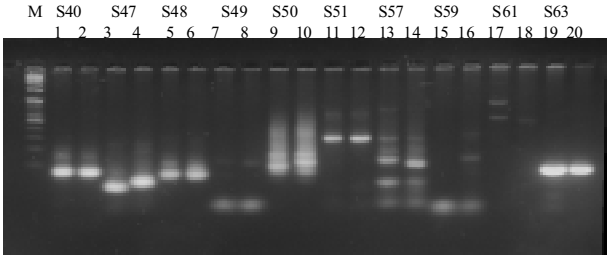


Nematicidal activity of highly non-polar fraction of sorghum root exudates against root knot nematode

Bansa Singh and Lalit Kumar

Molecular Markers for Fusarium Wilt Resistance Gene in Chickpea

To map Fusarium wilt resistance genes in chickpea, identification of molecular markers revealing polymorphism between contrasting parents is a pre-requisite. Three different marker systems *viz.,* RAPD, ISSR and STMS were used for polymorphism between BG 256 (susceptible) and WR 315 (resistant) genotypes. Among 180 RAPD primers, 44 (24.44%) showed polymorphism between BG 256 and WR 315. Seventy seven chickpea specific SSR primers were also tried for detection of parental polymorphism, among which 46 (61.33%) primers were polymorphic. Some SSR primers specific to other leguminous crops were also tried. Out of these primers, two each from pigeonpea, common bean and lentil showed polymorphism. Out of 20 ISSR primers tried, only one could show polymorphism. These results show that reasonable amount of genetic diversity exists among the two parents and these are well suited for development of mapping population for tagging wilt resistance gene in chickpea.



SSR profile of wilt susceptible and resistant genotypes in chickpea

Lanes: M- marker 100 bp DNA ladder, Lane 1&2: SSR 40, Lane 3&4: SSR 47, Lane 5&6: SSR 48, Lane 7&8: SSR 49, Lane 9&10: SSR 50, Lane 11&12: SSR 51, Lane 13&14: SSR 57, Lane 15&16: SSR 59, Lane 17&18: SSR 61, Lane 19&20: SSR 63. Order of genotypes: BG-256 followed by WR315

S. Datta, P. Raychaudhury, N.P. Singh and Shiv Kumar

Pyramiding of Resistance Genes for Fusarium Wilt in Chickpea

A major biotic factor which limits chickpea production world wide is the disease caused by *Fusarium oxysporum* sp. *ciceri*. Out of seven physiological races reported worldwide, race 1, 2, 3 and 4 have been reported in India. Pyramiding of resistance genes in popular varieties will enhance the stability and durability of the resistance. IIPR has undertaken a network project aiming at targeted introgression of Fusarium wilt resistance genes against race 1 and race 4 in the widely adapted chickpea cultivars *viz*., Pusa 256, Vijay and Phule G 5 through simultaneous step-wise backcross programme. The sources of resistance for race 1 and race 4 are WR 315 and ICC 4958/HC3, respectively. Total 110 primers (RAPD, STMS and SSR) were used for assessing the polymorphism. Among them, TA 69, TA 96, TA 194, TAA 60, R 2609-1, OP-U 17-1, CS 27, UBC 170 have been in the same linkage group with genes responsible for imparting resistance against race 1 and race 4. These markers are being used to monitor resistance genes in backcross population for their introgression in Pusa 256, Vijay and Phule G 5.

P.K. Agrawal, S. Datta and Shiv Kumar

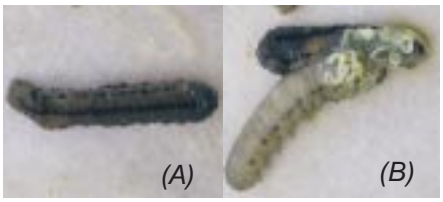
Our New Publication

A book **"Advances in Mungbean and Urdbean"** edited by Drs. Masood Ali and Shiv Kumar has been published by the Institute. The book covers exhaustive and critical reviews on genetic resource management, varietal development, cropping systems, agronomy, pest management and post-harvest management in addition to basic knowledge on genetics & cytogenetics, physiological processes, biological nitrogen fixation and biotechnological interventions with a global perspective on these crops in its 16 well structured chapters.

First report on Mortality of Mustard Saw Fly through EPNs

The infectivity of entomopathogenic nematodes (EPN), *Steinernema masoodi, S. seemae, S. carpocapsae, S. feltiae* and *Oscheius* sp. was tested against mustard saw fly, *Athalia proxima*, a foliage feeder of mustard and *in vivo* mass production of these species of EPN was studied.

Observations revealed that *S. seemae* and *S. carpocapsae* were most effective, killing *A. proxima* within 96 h, while *S. masoodi, S. feltiae* and *Oscheius* sp. caused mortality within 144 h. Observation on multiplication of EPN on this insect showed that the highest yield of 65, 766 IJs/cadaver was recorded in Oscheius sp., followed by 62,700 (*S. feltiae*) and 57, 299 IJs/cadaver (*S. carpocapsae*). No mortality was found in control. Infectivity of *A. proxima* by entomopathogenic nematodes is being reported for the first time. This opens a new hope for utilizing EPN in management of mustard saw fly, *Athalia proxima*.



Infectivity of entomopathogenic nematodes against A. proxima. (A) - Healthy larva, (B) - emergence of EPN from infected larva.

Rashid Pervez, S. S. Ali and R. Ahmad

Brain Storming on Breaking Yield Plateau in Pulse Crops

A Brain storming meeting on "Breaking Yield Plateau in Pulse Crops" was organized by ICAR on November 14, 2006 at NBPGR, New Delhi under the Chairmanship of Dr. Gautam Kalloo, Deputy Director General (CS & Hort.). Dr. Kalloo highlighted the need for identifying major production constraints and formulate the strategies to manage them. Considering the fact that utilization of wild species has paid rich dividends in a number of crops like rice, tomato and oat in terms of identifying yield QTLs and developing high yielding varieties in several crops including mungbean, there is a need to undertake pre-breeding in pulse crops as well involving wild species. Dr. Masood Ali raised his concern on the narrow genetic base of pulse varieties and asked the breeders to involve more parents in the crossing programmes. Dr. Kalloo suggested to exploit reservoir of useful genes from wild species for improving cultivated species of chickpea, pigeonpea and *Vigna* crops, and broadening the genetic base. Further, it was decided that concerted efforts should be made for pyramiding of genes conferring resistance to different races of fusarium wilt in chickpea and pigeonpea. The information generated from the Network project on wilt should be utilized while recasting the on-going projects.

The Group was of the view that there is no reliable source of resistance against *Helicoverpa* pod borer in cultivated and wild germplasm of chickpea and pigeonpea, and therefore, transgenics using *bt* and plant derived genes need to be developed. Similarly, exploitation of heterosis using CMS system was recommended in all maturity groups of pigeonpea. Among abiotic stresses, drought and high temperature were identified as major constraints limiting the productivity, which need to be managed through identification and utilization of QTLs. In view of the discussion held, focused research projects indicating collaborating partners were developed.

Annual Review Meeting of Wilt Network Project

The 2nd Annual Review Meeting of Network Project on "Wilt of crops with special reference to cultural, morphological, and molecular characterization and pathogenic variability of isolates in India" was held on November 24, 2006 at NBPGR, New Delhi under the chairmanship of Dr. G. Kalloo, DDG (CS & Hort.). After a brief introduction about the project by Dr. T.P. Rajendran, ADG (PP), ICAR, Dr. Vishwa Dhar, the Network Leader, presented the highlights of the research achievements for the year 2005-06. Subsequent presentations were made by the PIs on the progress of pulses and other crops. The Chairman expressed satisfaction and appreciated the progress of achievements under the project.

Personnel

Appointment

Shri Koushlendra Tiwari has joined as Administrative Officer at this Institute on 30.10.2006.

Shri Kanhaiya Lal has joined as Technical Assistant (T-II-3) at this Institute on 13.10.2006

Transfer

Name	Post	From	To	W.e.f.
Dr. Shantanu Kumar	Scientist (SS)	CPRS, Shillong	IIPR, Kanpur	20.10.06
Smt. Uma Sah	Scientist (SS)	CPRS, Shillong	IIPR, Kanpur	20.10.06

Promotion

Name	Promoted to	*W.e.f.*
Shri Radha Krishan	T-6	01.01.06
Shri Omkar Nath	T-6	12.08.06
Shri Ajeet Pratap Singh	T-5	02.09.06
Shri Krishna Autar	T-4	23.08.06
Shri Kailash Chandra	T-4	20.03.06
Shri J.B. Thapa	T-3	29.06.06
Shri Jiya Lal	T-3	29.06.06
Shri. S.N. Hatia	T-3	29.06.06
Shri Satish Kumar Singh	T-3	29.06.06
Shri Kishan Singh Meena	T-3	29.06.06

Retirement

Name	Post held	W.e.f
Dr. S.B. Singh	Principal Scientist	31.12.06
Dr. S.P. Mishra	Project Coordinator (Chickpea)	31.12.06
Shri Radhey Shyam	Personal Secretary	31.12.06
Shri B.P. Ram	Assistant	31.12.06

Distinguished Visitors

Name	Affiliation	Date
Prof. G.S. Chauhan	Director, NRC Soyabean, Indore	25.11.06
Dr. Arun Goyal	HoD, Biol. & Env. Science, Texas A & M University	29.11.06
Dr. S.L. Mehta	Vice-Chancellor, MPUA&T, Udaipur	30.11.06
Dr. R.B. Singh	Ex- Member, NCF	10.12.06
Dr. S.N. Puri	Vice-Chancellor, CAU, Imphal	10.12.06
Dr. D.S. Rathore	Vice-Chancellor, CSKHPKV, Palampur	10.12.06
Dr. R.C. Maheshwari	Vice-Chancellor, SDAU, SK Nagar	10.12.06
Dr. S.S. Baghel	Vice-Chancellor, AAU, Jorhat (Assam)	11.12.06
Dr. A.R. Trag	Director Research, SKUA&T, Srinagar	11.12.06

Honour/Recognition

Dr. Masood Ali, Director, IIPR was awarded ISA Gold Medal for his outstanding contributions to agronomy. The award was presented during Golden Jubilee National Symposium on Conservation Agriculture and Environment, held on October 26-28, 2006 at BHU, Varanasi. Dr. Ali has made signficant contribution in pulses improvements, cropping systems and dryland agriculture. Dr. Masood Ali has also been nominated as Member of Senate of Indian Insitute of Technology, Kanpur for 2006-07.

ANNOUNCEMENT

National Symposium
on
Pulses for Ecological Sustainability: Emerging Challenges and Opportunities
to be held on
November 3-5, 2007
Organized by
Indian Society of Pulses Research and Development
at
Indian Institute of Pulses Research, Kanpur

For further details, please contact:
Dr. Sanjeev Gupta
Organizing Secretary, NPS 2007
Indian Institute of Pulses Research
Kanpur - 208 024
Tel.: Office (0512)-2572464-65, Ext. 276
(R) 2574288, Mobile 09336119397
Fax: (0512) 2572582
e-mail: saniipr@rediffmail.com

राष्ट्रीय किसान मेला आयोजित

किसान सम्मान दिवस के अवसर पर भारतीय दलहन अनुसंधान संस्थान में राष्ट्रीय किसान मेला एवं कृषि प्रदर्शनी का आयोजन किया गया। प्रो. चन्द्रिका प्रसाद, महानिदेशक, उ. प्र. कृषि अनुसंधान परिषद्, लखनऊ ने किसान मेले का उद्घाटन किया। डा. अशोक बाजपेई, कृषि मन्त्री, उत्तर प्रदेश सरकार,

किसान सम्मान समारोह एवं कृषक गोष्ठी में मुख्य अतिथि थे। इस कार्यक्रम में हमीरपुर, कन्नौज, रायबरेली, कानपुर नगर, कानपुर देहात, फतेहपुर एवं उन्नाव के 800 से अधिक किसान सम्मिलित हुए। किसानों के हित में वैज्ञानिक प्रतिबद्धता पर जोर देते हुए डा. बाजपेई ने कहा कि किसान - शोध संस्थान - सरकार की सामूहिक भागीदारी से ही देश में खुशहाली आयेगी। उन्होंने कृषि को लाभकारी बनाने के लिए कृषि निवेश की उपलब्धता सुनिश्चित करने पर बल दिया और कहा कि किसानों को न्यूनतम ब्याज दरों पर कृषि ऋण मिलना चाहिए। मुख्य अतिथि ने तीन जिलों से चयनित पाँच प्रगतिशील कृषकों को सम्मानित किया एवं मूँग की उन्नत प्रजातियों के बीजों का वितरण भी किया।

प्रो. चन्द्रिका प्रसाद ने परम्परागत खेती पर बल देते हुए कहा कि कृषि एवं पशुपालन दोनों के समन्वय से ही खेती में टिकाऊपन आ सकता है । उन्होंने कहा कि वे पद्मभूषण तथा पद्मश्री पुरस्कारों की सूची में किसानों को भी देखना चाहते हैं। कार्यक्रम की अध्यक्षता कर रहे श्री बलवान सिंह, पूर्व विधायक ने गेहूँ एवं दालों के बढते हुए आयात पर चिन्ता व्यक्त की और किसानों की स्थिति में सुधार हेतु उचित कदम उठाने पर जोर दिया। संस्थान के निदेशक डा. मसऊद अली ने संस्थान की शोध उपलब्धियों तथा अन्य क्रियाकलापों का उल्लेख करते हुए कहा कि देश में दलहनी फसलों की उत्पादकता बढ़ाने के लिए संस्थान द्वारा विकसित प्रजातियों एवं अन्य तकनीकियों को किसानों तक पहुँचाने हेतु और अधिक प्रयासों की आवश्यकता है।

किसान मेला एवं कृषि प्रदर्शनी में भारतीय कृषि अनुसंधान परिषद् के विभिन्न संस्थान, राज्य कृषि विश्वविद्यालय, अनेक अन्य संगठन, बैंक, कृषि यन्त्र निर्माता व पादप सुरक्षा से जुड़े अनेक प्रतिष्ठानों ने सहभागिता की और दलहनी फसलों के साथ-साथ अन्य खाद्यान्न फसलों, पशुधन, कृषि यन्त्रों, पादप सुरक्षा तथा कृषि ऋण से जुड़ी अहम जानकारी कृषकों को दी।

Director's Desk

Dear Readers,

Greetings of the New Year!

The prediction by the World Meteorological Organization (WMO) that the year 2007 would be the warmest year has rung the alarm bell for agricultural production and our concern for the climatic changes. The global surface temperature is projected to be 0.54°C above the long-term average of 14°C in 2007, beating the current record of 0.52°C, which was set in 1998. The forecast was primarily based on two factors, greenhouse gas emissions from human activity and El Nino weather event in the Pacific Ocean. The six warmest years (1998, 2002, 2003, 2004, 2005, and 2006) over the last century have occurred since 1997. The Earth has warmed by 0.6°C over the past 30 years and 0.8°C over the past 100 years. Analysis of carbon dioxide in the ancient Antarctic ice showed that at no point in the past 650,000 years did levels approach today's carbon dioxide concentrations of around 380 ppm, which is almost 27% higher than that in any point of time in the past. The Intergovernmental Panel on Climate Change (IPCC) projects that atmospheric carbon dioxide levels could reach 450-550 ppm by 2050, possibly resulting in higher temperatures and rising sea levels.

These global climate changes are expected to have substantial hydrological impacts, and are specifically anticipated to increase the intensity and frequency of drought. India has arid to semi-arid climate and this is exactly what makes it more vulnerable to the smallest changes in climate. This can be judged from the fact that the country had experienced less than normal rainfall in six years since 1997. Out of these six years, two years 2000-01 and 2002-03 had worst drought, affecting the pulses production adversely. Since pulses are mainly grown under rainfed conditions, both the area sown and the yield realized depend mainly on the available rainfall, and any shortage in rains has direct adverse effect on production. A powerful example of drought's impact on pulses production can be seen from the zigzag trend in pulses production in the country since 1997. Almost every upward movement in pulses yield and area was followed by major downswings mostly caused by drought. The area and productivity of pulses in drought years were around 20.5 million ha and 540 kg/ha, respectively, resulting in pulses production of around 11 million tons in 2000-01 and 2002-03, while normal monsoon years of 1998-99 and 2003-04 observed highest ever production of pulses in the country, almost touching the figure of 15 million ton mark. These figures show that the impact of drought on pulses is loss of area to the tune of almost 2-3 million ha and drop in productivity by 50-70 kg/ha.

Improved technologies such as development of varieties tolerant to drought and temperature extremities are important to contain the adverse effect of these climatic changes. Efforts are underway to develop varieties and crop management practices to improve plant performance under drought condition and enhance water productivity. However, substantial scientific breakthroughs need to be made in dealing with climatic changes including rising temperature, carbon dioxide and deficient rainfall. Increased research investment coupled with effective soil and water management programme will help raise and stabilize farm incomes, and eliminate the worst effects of this scourge of nature. Presently, we are in the process of finalizing the work plan for the XI Plan and I hope that the pulse scientists will keep these emerging challenges in mind while formulating the research programmes.

(Masood Ali)

Published by Dr. Masood Ali, Director, Indian Institute of Pulses Research, Kanpur-208 024
Tel. : 0512-2570264, EPBAX Lines - 2572464, 2572465; Fax : 0512-2572582
E-mail : root@iipr.ernet.in; Website; http://www.iipr.res.in

Printed at Army Printing Press, 33, Nehru Road, Sadar Cantt. Lucknow-226 002. Tel. : 0522-2481164, 2483354