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Towards Pulses Self-sufficiency in India

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI

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Preface

Pulses are a major source of dietary protein in India, especially for the majority low-income households, besides being rich in essential minerals, vitamins and fibres. Currently producing 17 to 18 million tonnes, India is the largest producer of pulses in the world. But, the demand has increasingly outstripped the supply, necessitating imports of about 3-5 million tonnes, the largest in the world, costing over US dollar one billion annually, let alone the erratic price rises. Keeping in view the growing costly imports, thin global market, and volatile prices, India ought to become self-sufficient in pulses, and attain the projected production of 24 million tonnes by 2020.

The National Academy of Agricultural Sciences, in collaboration with ICAR, involving all stakeholders - policy-makers, academia, development leaders, and farmers, organized the ***Strategy Workshop: Towards Self-sufficiency of Pulses in India*** on 7-8 April, 2016 to deliberate the challenges, opportunities and prospects. Critically analyzing the current and projected situations of production, consumption, and trade, in light of the technological, socio-economic, market, and agro-ecological domains, the Workshop, as contained in this document, has prepared a detailed strategic framework and comprehensive district-wise action plan for 19 of the pulses-producing provinces, Madhya Pradesh, Uttar Pradesh, Maharashtra, Andhra Pradesh, Karnataka and Rajasthan, jointly accounting for 77% of the national production. I sincerely hope that all stakeholders at the national, provincial, district and village clusters levels will judiciously implement the Action Plan and render India pulses self-sufficient by the year 2020.

I express my gratitude to Dr Ramesh Chand, Member NITI Aayog, Dr S.K. Pattanayak, Secretary, DAC&FW, Dr T. Mohapatra, DG, ICAR and Secretary, DARE, Dr R.S. Paroda, Chairman TAAS and other experts for their guidance and thought provoking inputs. I am grateful to Prof R.B. Singh, Immediate Past President, NAAS, for shaping this Strategy Paper. I am thankful to Dr M.C. Saxena and Dr N.P. Singh, Conveners, for piloting this event. My thanks are also due to Dr K.K. Vass and Prof V.K. Gupta for their editorial help.

S. Ayyappan
President

Towards Pulses Self-sufficiency in India

The Context

Pulses form an important constituent of the food basket, serving as a cost-effective and nutritionally balanced rich source of protein for our people. But, the production of pulses has lagged far behind the consumption needs during the past decade or so. Consequently, the prices of pulses have risen sharply because of the increasing demand and fall in domestic output. Recognizing that India is the biggest producer, consumer, and importer of pulses in the world, and realizing the problem of stagnant pulses production, the sharply rising costly imports, and the high strategic importance of pulses in food and nutritional security of the majority poor in India, it was felt essential to strategize boosted and sustained domestic production of pulses to attain self-sufficiency, especially at the household level, in the shortest period.

The Strategy Workshop

A Strategy Workshop: Towards Achieving Self-sufficiency of Pulses in India was organized under the auspices of the National Academy of Agricultural Sciences (NAAS) on 7-8 April 2016, New Delhi. Major stakeholders, including Member Niti Aayog, Secretaries of concerned Departments of the GoI, Directors General, Directors of national and international organizations/institutes, academia Presidents/Chairmen, and farmers representatives, in all over 130 eminent experts, had participated in this high level Workshop (a copy of the technical programme and list of chairs and speakers is attached).

Echoing the global theme of the International Year of Pulses, 2016, “Nutritious Seeds for a Sustainable Future”, six topics, namely, genetic enhancement, sustained increase in productivity, climate smart farming, harvest and post harvest management, trade and policy, and new dimensions were deliberated at the Workshop. Discussing the availability of existing improved technologies, including varieties and quality seeds, for production of pulses, their dissemination to the farmers, policies related to pulses production, their marketing, and post harvest processing in India, and related trade issues, the Workshop suggested way forward to achieve the goal. Identifying the ongoing efforts, the gaps, the challenges, and analyzing the future demands and prospects, a Strategy and Action Plan was prepared for achieving pulses self-sufficiency in the country by 2020.

The Challenges

The Workshop appreciated the past and ongoing efforts of the stakeholders in enhancing production and distribution of pulses in the country, such as the RKVY, NFSM etc. But,

it found that the efforts, often due to poor implementation and policy gaps, have failed to yield desired results. The following were identified as the major gaps and challenges:

- Unreliable, inaccurate, asymmetrical and often contradicting data on several vital components, *viz*. coverage under hybrid pigeonpea varieties, production and distribution of quality seed and its flow from the breeder's plot to the farmer's field
- Poor monitoring and lack of impact pathway analyses, and accountability along the value chain
- Low yield and productivity, huge yield gaps, and stagnating and low TFP growth
- High incidences of pests and diseases, including blue bull menace, and the attendant high losses
- Poor adoption of complete packages of practices *viz.* latest improved varieties, IPM, IPNS, water management, conservation cultivation, mechanization etc. in a holistic way
- Huge post-harvest losses, negligible value addition
- Highly volatile pulses prices, market instabilities, and generally un-incentivized farmers

The Strategy

Recalling that (i) pulses in India are strategically important from the points of view of food, nutrition and income security, especially of the majority poor and smallholder farmers, nitrogen and carbon economy, conservation agriculture, sustainable environment, and climate resilience, (ii) realizing that imports are not a feasible option to meet the domestic demand since the pulses international market is too thin, let alone the economic burden, and (iii) appreciating that import is against the spirit of the Right-to-Food Bill, the Workshop suggested, the following strategies to achieve sustainable pulses self-sufficiency in India by the year 2020.

Diversification to Pulses

The widening demand-supply gap can be considereably abridged by increasing area under pulses through diversification to pulses. As a dozen of pulse crops are grown commercially throughout the country with their specific adaptation ranges, a differentiated and disaggregated approach based on agro-ecological and socioeconomic capabilities should be followed. The following steps will be needed:

- Prepare a national pulses capability map
- Create thousands of clusters of pulses villages with convergent support of technologies, inputs and markets.

- In about 3 to 5 million ha of the vast rice-wheat and other fallows, depending on soil moisture and water availability, introduce a short duration pulse crop, *viz.* mungbean or urdbean or cowpea or horsegram, and using conservation agriculture techniques, promote the augmentation of the nitrogen and carbon economy, income growth and, above all, protein nutrition.
- Consistent with the overall national food security and farmers' income, demonstrate at farmers' fields that diversification out of the rice-wheat system to selected pulse crops will save water without sacrificing farmers' income. Short duration (120-125 days) pigeonpea genotypes, now available, can fit in a pigeonpea-wheat cropping pattern with economic returns analogous to those from the prevalent rice-wheat system, plus a huge bonus in terms of soil fertility, reduced water consumption, and enhanced human nutrition.
- Undertake pilot-testing of proven wholesome packages of technologies in the target areas. Based on the pilot results, and examining the economic viability, replicability, and sustainability of the technology, in close collaboration with the development partners and farmers, scale-up and scale-out the technologies for desired inpact.

Bridging Yield Gaps and Enhancing Total Factor Productivity (TFP)

Huge realizable yield gaps exist in all pulse crops. Moreover, the TFP has not only been low but extremely sluggish. The gaps may be attributed to the 'extension problem', or to the failure of the farmers to use the new technology, or even to the shortcoming in the technology itself. Towards bridging the gaps, the following steps are needed:

- Map out the low yield and low productivity areas and ascertain location-specific causes of the gaps and low factor productivity, and promote specific land and water use decisions by restructured State Land Use Boards to realize the yield and income potential
- In order to get the technologies moving and to ensure access of farmers to the technologies, establish a trained, retooled and dedicated cadre of pulses extension workers, congruent with the agricultural research and technology development and transfer system
- Critically assess the prospect of hybrid pigeonpea, and in collaboration with the private sector, undertake a mission mode approach to judiciously spread the successful hybrids
- Enhance varietal and seed replacement rate (SRR); varieties older than 10 years should be replaced with new varieties and SRR be increased beyond 30%
- Strengthen seed production and distribution system by public-private partnership; Pending establishment of seed hubs, quality seed production through the Krishi Vigyan

Kendras and from the large-scale demonstrations done under the NFSM should be ensured; Pulses seed villages should be created

- Promote mechanization in pulses and reduce the cost of cultivation through farm mechanization and integrated pest management approach; Increase farm mechanization by promoting custom hiring of the implements and ensuring their availability at community level
- Increase availability of well tested and certified bio-fertilizers and bio-pesticides with direct subsidies to farmers, linking with the *Jan Dhan Yojana*

Natural Resources Management – "Save and Grow"

The soil, water and biodiversity resources are shrinking fast. A twin approach to save and conserve the resources and to enhance the efficiency of their uses is the way forward. Pulses are important from both the angles, hence the following suggestions:

- Promote pulses-based conservation agriculture through enhancing their use as catch, inter, companion or cover crop, and sensitize the farmers of the unique and the most important role of pulses in nitrogen economy, carbon enrichment, climate resilience and wide adaptability
- Increase rain-water conservation through creation of farm ponds and reservoirs; Promote efficient water management through use of micro-irrigation system, powered by solar energy, and integrate it with the *Pradhan Mantri Krishi Sinchai Yojana;* Based on the national food security policy, divert some of the area from cereals to pulses in irrigated belts of the country, thus restoring part of the congenial areas to pulses which were diverted to cereals during the Green Revolution
- Promote effective and widespread use and adoption of the Soil Health Card scheme particularly to combat widespread nutrient deficiency of secondary and micronutrients *viz.*, sulphur, zink, boron and molybdenum in soils by including these elements in integrated nutrient management.

Linking Farmers with Markets, and Value-Chain Management

Assured and remunerative markets are essential for accelerating pulses production. Towards this:

- Augment the physical and economic connectivity of the farm to the market, and strengthen post-harvest operations including the role of food processing industries; Mini dal mills, giving more than 75 percent recovery, should be subsidised to increase their availability at farm level, which will greatly reduce the post-harvest losses and improve the storability – both adding to the farmers' income

- Integrate the pulses markets through ICT and promote E-trade, and enable farmers to use these developments to get full value for their produce

Multidisciplinary Teams, Public-Private-Producer Partnership and Community Participation for Holistic and Synergistic Outcomes

Multidisciplinary teams, including plant breeders, agronomists, agricultural engineers, socio-economists should be organized for generating and transferring new technologies to overcome the multiple complex problems affecting the pulses production and economy. For instance, a pigeonpea breeder alone cannot design an ideal plant type suitable for mechanical harvesting and multiple and inter-cropping under conservation agriculture without closely collaborating with the allied experts. Thus, integrated holistic technology packages should be transferred through an interdisciplinary approach in technology generation, evaluation and dissemination, particularly for enhancing efficiency of water, land, fertilizer and other inputs uses leading to higher resilience, productivity and the farmers' income. The proposed National Pulses Board is supposed to manage the strategic alliance and coordinaton. The following steps are required:

- Encourage public-private partnership all along the value chain, in all aspects of pulses production and post-harvest handling, especially in seed production and distribution, agroprocessing and marketing
- The private sector could be encouraged to explore possibility of contract farming in those friendly countries which have well endowed areas available for producing special pulses needed by India, processing there, and shipping the processed produce to India. This could prove to be a win-win initiative and encourage goodwill with collaborating countries, as it will also contribute to economic benefit to local communities involved in production and processing
- Based on the experience of National Dairy Development Board, establish Farmers' Agri-business Consortia through Farmer Producer Companies and arrange sale/distribution of their produce at various outlets; Enable the groups to do value addition at their own village level using improved dal mills, cleaning and packaging

Strengthen Research, Technology Generation, Extension and Demand-Driven Innovations for Pulses Development

Technology and innovations shall drive the future development of pulses, especially keeping in mind the needs of the majority smallholders. Frointier technologies should also be applied, with focus on:

- Restructuring plant types for achieving productivity break-through and facilitating mechanization and new cropping patterns
- Strengthening pre-breeding using available germplasm for broadening the genetic base and genetic enhancement through integrated approach and modernization of pulses breeding programmes
- Intensifying search for new genes in wild as well as in other crop species in order to bring a breakthrough in pulses yield as well as to enhance their resilience to climate change and other stresses
- Increasing genetic gains through novel technologies including transgenics, genomics and genome editing
- Enhancing biological nitrogen fixation through development of super-nodulating plant types and optimizing host and symbiont genotype combination
- Incorporating photo-thermal insensitivity and breeding short duration varieties for increasing cropping intensity
- Perfecting hybrid technology in pigeonpea and exploring that in other crops
- Strengthening research on storage structures and conditions to minimize storage losses
- Perfecting conservation agriculture techniques for different production systems and developing the needed farm machinery
- Enhancing phosphorus and other nutrients-use efficiency
- Strengthening research on value-added products, particularly increasing the nutritional value of pulses through bio-fortification and strategic value addition

Policy Options and Interventions

The technology application and development processes towards achieving pulses self-sufficiency should be supported and enabled by the following policy options:

- Towards a pulses-centric approach, establish a separate **Pulses Mission** and a **National Pulses Board** with a single window system for sustainably enhanced pulses productivity and production, which is needed for adoption of a mission-mode approach with coordination and convergence of all concerned departments and stakeholders towards achieving synergy, avoiding duplications and leveraging related initiatives; The Board should also help evolve a science-informed policy on GM pulses, and promote participatory and demand-driven research
- Institutionalize impact analysis pathway platform to analyze government policies in a transparent way and to monitor and evaluate outputs, outcomes and impact, and to fix differentiated accountability

- Focus on major pulse-producing states rather than distributing the resources all over the country for development efforts; The selected states may be incentivized for their contributions to the nitrogen economy, increased soil carbon content and the associated environmental benefits
- Incentivize the pulses producers through attractive (substantially high) minimum support price and a robust procurement network, and by linking farmers to market
- Ration pulses at subsidized rates to BPL families through the public distribution system; include pulse-based snacks/food in the mid-day meal scheme at the schools
- Enforce the National Food Security Act in all states to enable the BPL households to save on wheat and rice and free their income to purchase pulses
- Institute policy of stern action under the essential commodities act to recover illegal stocks from hoarders and black marketers
- Create strategic reserves of major pulses and undertake buffer stocking of pulses as an integral component of pulses trade and price stabilization
- Expedite the crop insurance scheme to cover pulses; The crop insurance scheme should cover the damage caused to pulses by wild animals including blue bulls, deer, boars and monkeys, and develop clear government policy to this effect
- Provide enhanced committed core governmental funding for strengthening basic, strategic and applied research in pulses, channel funds to well designed projects and for strengthening IIPR and AICRPs, and to the technology assessment and transfer programmes; Encourage the private sector to invest in research and technology generation for the development of pulses
- Towards enhancing the availability of dietary protein, declare soybean as a food crop under the group of food legumes and encourage its direct domestic use by value addition through processing and product development

The Action Plan

Given the high agro-ecological suitability, rich indigenous and endogenous biodiversity and wide spectrum of scientific know-how and technologies for pulses, India must achieve the alluding pulses self-sufficiency within the next five years, which is not only economically, socially, and environmentally justified, but also well within India's reach. To reach there, the above strategies provide a framework for policy options and actions and their implementation, as detailed in Tables 1 to 4.

Table1: Approach and targets to improve pulses production

Sl. No.	Approach	Target	Target by 2020	Target by 2025
1	Productivity Enhancement	Improving productivity from 786 kg/ha to 1000 kg/ha	Production: 23.50 million tonnes Productivity: 900 kg/ha	Production: 27.50 million tonnes Productivity: 1000 kg/ha
2	Increasing the area under cultivation	Bringing 3.0-4.0 million ha additional area under cultivation from existing 24.0 million ha	26.0 million ha	27.5 million ha
3	Reducing duration of crop	Diversification of cropping system into new system and niches	Reduction in maturity duration of existing varieties (in days) *Mungbean*: (for spring/summer season and *rabi* rice fallow): (10-12 days) to duration of 50-55 days *Cowpea*: (10-12 days) to crop duration of 55-65 days	Reduction in maturity duration of existing varieties (in days) *Urdbean*: (for spring/ summer season and *rabi* rice fallow) : (10-12 days) to duration of 60-65 days *Chickpea/lentil*: (for rice fallow): (15-20 days) to crop duration of 100-110 days Early duration *Pigeonpea*: (20-30 days) to crop duration of <120 days

Table 2(a): Detailed action plan for productivity enhancement

Sl. No.	Approach	Activity	Action Plan	Agencies involved	Achievable Production target (million ton)	
					2020	2025
1	Dissemi-nation of existing technologies	Adoption of existing technology	• Demonstrations of good agronomic practices and varieties on farmer's fields • Popularization of chickpea and mungbean varieties amenable for mechanical harvesting	Extension agencies-ICAR, SAUs, KVKs, State Department of Agriculture, DAC, Ministry of Agriculture; Govt. of India	1.0	1.5

2	Institutional / Policy support	Improving Seed Replacement Rate (SRR)	• Rolling plan to ensure quality seed supply of newly released varieties in each state • Better conversion of breeder seed to foundation and certified seed • Maintenance of Seed buffer of improved varieties at State Seed Corporation level • Public- Private partnership in seed business • Farmer's Participatory Seed Production for farmer to farmer seed spread	DAC DAC, NSC, SFCI, SSCI SSCI Mechanism of SAUs, ICAR, KVKs and state seed corporation	0.50	1.0
		Provision for life saving irrigation in pulse growing districts	• Micro-irrigation through sprinklers system • Rain- water harvesting in farm ponds and community reservoirs	Enabling mechanism by DAC	0.30	0.50
		Ensuring availability of critical inputs	The critical inputs like biofertilizers, sulphur, zinc, micronutrients, agrochemicals, biopesticides, etc. at state level	Enabling mechanism by DAC and State Department of Agriculture.	0.30	0.50
		Mechanization in pulses production	Reported machines for sowing, harvesting, intercultivation, threshing, processing to be made available through cooperatives or custom hiring	Enabling mechanism by DAC	0.30	0.50
		Policy Support for value chain	• Credit, insurance, attractive MSP with procurement, incentives (subsidies) • Processing and value addition • Innovative institutional models of marketing like Amul, Parag, Dhara etc.	Appropriate arrangements by Government Public – Private institutions NAFED, Cooperatives	0.3	1.0
3	Research Strategy	• Integrated breeding for development of improved cultivars with high yield potential • Enhancing average yield potential (in Kg/ha) of chickpea and Pigeonpea from 1800 to 2400; • mungbean and urdbean from 1200 to 1600; • Lentil from 1400 to 1800 fieldpea from 2500 to 3000	• Introgression of QTLs for improving productivity, harvestability, quality and marketability • Pyramiding resistant gene(s) for various races of important diseases like wilt in chickpea and pigeonpea • Developing intragenics / Cisgenis and transgenics against pod borer in chickpea and pigeonpea and MYMV in mungbean and urdbean • Allele mining and proteomics for MAS under biotic and abiotic stress • Developing climate resilience in pulses for tolerance to temperature extremities and drought for winter pulses • Harnessing heterosis in pigeonpea to increase its yield by 30-40 per cent • Restructuring photo-synthetically efficient plant types for new niches through farmers' participatory varietal selection	ICAR, SAUs and CGIAR Institution - ICRISAT and ICARDA	0.5	0.70

		• Development andrefinement of location specific and cost effective crop management practices	• Development and adoption of micro-irrigation techniques for enhancing water use efficiency • Intensifying conservation agriculture practices • Promoting the use of rhizobia in increasing productivity of various pulses • Use of nanotechnology for better water and nutrient use efficiency • Increasing nutritional quality of pulses through bio- fortification and popularization of pulses as health food • Forecasting and forewarning strategy for optimizing results to ensure maximum returns to the farmers • Capitalization on information technology for market intelligence and technology transfer	ICAR, SAUs and CGIAR Institution - ICRISAT and ICARDA	0.5	0.70

Table 2(b): Detailed action plan for increasing area under cultivation

Sl. No.	Potential crop / cropping systems / niche	Specific area	Potential area (m ha)	Total Target area (m ha)		Target of additional production (m ton)		Agencies involved
				2020	2025	2020	2025	
1.	**Intercropping**							
	Mungbean with Sugarcane (irrigated) Mungbean with Cotton and millets (rainfed uplands)	Western U.P., Central U.P., Eastern U.P., Bihar Maharashtra, A.P. and T.N.	0.70	0.30	0.40	0.10	0.15	Developmental Agencies-State Department of Agriculture, DAC, KVKs, SAUs, ICAR
	Pigeonpea with soybean, sorghum, cotton, millets and groundnut (rainfed upland)	A.P., Malwa Plateau of M.P., Vidarbha of Maharashtra, North Karnataka, T.N.	0.50	0.30	0.30	0.20	0.20	
	Chickpea with barley, mustard, linseed and safflower (rainfed)	South East Rajasthan, Punjab, Haryana, U.P., Bihar, Vidarbha of Maharashtra	0.50	0.10	0.20	0.05	0.10	
	Chickpea/lentil with autumn planted /ratoon sugarcane	Maharashtra, Uttar Pradesh, Bihar	1.00	0.30	0.50	0.20	0.30	

2.	**Catch crop :** Mungbean spring / summer	Western U.P., Central U.P. Haryana, Punjab, Bihar, West Bengal	1.00	0.50	0.70	0.20	0.30	
3.	**Rice fallows**							
	Chickpea	Eastern U.P., Bihar, Jharkhand, Orissa, Chhattisgarh, W.B.	0.40	0.20	0.30	0.15	0.30	
	Urdbean / mungbean	A.P., Tamil Nadu, Orissa, Karnataka	0.50	0.20	0.30	0.10	0.20	
	Lentil	Eastern U.P., Bihar, West Bengal, Assam, Jharkhand	0.30	0.10	0.30	0.05	0.20	
	Lentil/fieldpea	North-East	0.10	0.10	0.10	0.05	0.05	
4.	**Kharif fallow**	Urdbean / mungbean in Bundelkhand U.P., M.P.	1.20	0.30	0.40	0.10	0.15	
	Total		**6.2**	**2.4**	**3.5**	1.2	1.95	

Table 2(c): Plan for reducing crop duration

Crop	Present duration	Research strategy	Target	Time frame
Mungbean	65-70 days	Hybridization using cultivated germplasm and wild accessions for combining different components of maturity duration for reducing the crop duration and increasing per day productivity	50-55 days	2020
Cowpea	65-75 days		55-60 days	2020
Urdbean	75-85 days		65-70 days	2025
Lentil	110-130 days		100-110 days	2025
Chickpea	110-130 days		100-110 days	2025
Pigeonepa (short duration)	120-150		<120 days	2025

Table 3: District wise pulse area expansion plan by 2020 (ha)

Sl. No.	States/districts	Chickpea	Pigeonpea	Mungbean	Urdbean	Lentil	Fieldpea
1)	**Andhra Pradesh**						
1.	Krishna	0	0	1500	6000	0	0
2.	Ananthapur	5000	5000	3000	0	0	0
3.	Kurnool	10000	6000	0	0	0	0
4.	East Godavari	0	0	3000	2000	0	0
5.	West Godavari	0	0	1500	5000	0	0
6.	Chittor	3000					
7.	Guntur	0	2000	2000	5000	0	0
8.	Nellore	5000	1500	6000	4000	0	0
9.	Vizianagaram	0	0	3000	1000	0	0
10.	Prakasham	10000	3000	0	2000	0	0
11.	Cuddapah	5000	2500	3000	0	0	0
12.	Tirupathi	0	2500	0	0	0	0
	Total	**38000**	**22500**	**23000**	**25000**	**0**	**0**
2)	**Assam**						
1.	Barpeta	0	0	0	0	0	500
2.	Dhubri	0	0	0	500	0	0
3.	Dibrugarh	0	0	0	500	300	0
4.	Chirang	0	0	0	0	0	0
5.	Darrang	0	0	0	0	0	500
6.	Golaghat	0	0	0	0	0	500
7.	Jorhat	0	0	0	500	0	500
8.	KarbiAnglong	0	0	0	0	0	0
9.	Kamrup	0	0	0	1500	300	0
10.	Kokrajhar	0	0	0	2000	0	0
11.	Lakhipur	0	0	0	2000	300	500
12.	Morigaon	3000	1000	0	0		300
13.	Nagaon	4000	1000	0	500	300	300
	Total	**7000**	**2000**	**0**	**7500**	**1200**	**3100**
3)	**Bihar**						
1.	Arhasia	0	1000	0	0	0	300
2.	Aurangabad	2000	0	0	0	1500	500
3.	Bhabua	2000	0	0	0	0	0
4.	Bhagalpur	2000	0	0	0	600	300
5.	Bhojpur	2000	0	0	0	0	300
6.	Arwal	0	0	0	0	0	0
7.	Begusarai	0	0	0	0	0	300

8.	Champaran (east)	0	0	1000	0	0	0
9.	Champaran (west)	0	0	0	300	0	300
10.	Darbhanga	0	0	1000	0	0	0
11.	Buxar	2000	0	0	0	0	0
12.	Rohtas	2000	0	0	0	0	0
13.	Gaya	0	0	0	0	1500	0
14.	Jahanabad	2000	0	0	0	1500	0
15.	Katihar	0	0	500	400	0	0
16.	Khagaria	0	0	500	300	0	500
17.	Kishanganj	0	1500	1000	0	0	0
18.	Lakhisaria	0	0	0	0	1000	0
19.	Madhubani	0	0	1500	0	1000	0
20.	Madhepura	0	0	2000	0	0	0
21.	Monghyr	2000	0	0	0	1500	0
22.	Muzaffarpur	0	0	3500	0	0	0
23.	Nalanda	2000	0	0	0	1000	0
24.	Nevada	2000	0	0	0	0	0
25.	Patna	2000	0	0	0	2000	700
26.	Purnia	0	1500	1500	0	0	0
27.	Sitamarhi	0	0	550	0	0	0
28.	Saharsa	0	1000	2000	0	0	0
29.	Sahibganj	0	0	0	0	1000	0
30.	Samastipur	0	0	2000	0	0	0
31.	Supaul	0	0	1500	0	0	0
32.	Vaishali	0	0	1500	0	0	0
	Total	**22000**	**5000**	**20050**	**10000**	**12600**	**3200**
4)	**Chhattisgarh**						
1.	Ambikapur	0	2000	0	0	0	500
2.	Baikuthpur	0	1500	0	0	0	500
3.	Balod	0	0	0	0	0	0
4.	Bastar	5000	0	0	500	0	0
5.	Bijapur	0	0	0	0	0	0
6.	Bilaspur	5000	0	0	200	0	0
7.	Dantewara	8000	0	0	0	0	0
8.	Dhamtari	7000	0	0	0	0	500
9.	Durg	8000	0	0	0	500	0
10.	Jagdalpur	6000	0	0	0	0	0
11.	Janjgir-champa	0	0	0	1000	0	0
12.	Jaspurnagar	0	1500	0	0	0	0
13.	Kanker	6000	0	0	0	0	500

14.	Kawardha	5000	0	0	200	0	0
15.	Mahasmund	0	0	400	0	0	0
16.	Raipur	8000	0	0	500	500	0
17.	Rajgarh	0	0	400	0	0	0
18.	Rajnandgaon	8000	0	0	0	200	0
19.	Sarguja	0	0	0	1000	200	500
	Total	66000	5000	800	3400	1400	2500
5)	**Gujarat**						
1.	Ahmedabad	0	2000	0	0	0	0
2.	Anand	0	2500	500	0	0	0
3.	Areli	0	0	500	500	0	0
4.	Bharuch	0	2500	0	0	0	0
5.	Banaskantha	0	5000	3000	500	0	0
6.	Dang	0	3000	0	500	0	0
7.	Dohad	8000	2500	0	0	0	0
8.	Jamnagar	6000	2500	2000	500	0	0
9.	Junagadh	6000	2500	500	1500	0	0
10.	Kheda	0	3000	0	0	0	0
11.	Panchmahal	8000	2000	1000	0	0	0
12.	Porbander	10000	2500	500	0	0	0
13.	Narmada	0	1500	0	0	0	0
14.	Navsari	0	1500	0	500	0	0
15.	Mehsana	0	0	0	1000	0	0
16.	Rajkot	5000	1500	0	0	0	0
17.	Sabarkantha	0	4000	2000	5000	0	0
18.	Surat	0	2500	2000	0	0	0
19.	Surendranagar	5000	2500	0	0	0	0
20.	Tapi	0	2500	2000	0	0	0
21.	Vadodara	0	2500	0	500	0	0
	Total	48000	50500	14000	10500	0	0
6)	**Haryana**						
1.	Ambala	0	0	0	0	0	0
2.	Bhiwani	2000	150	900	0	0	0
3.	Hisar	2000	250	500	0	0	0
4.	Mahendragarh	1000	150	0	0	0	0
5.	Kaithal	0	150	0	0	0	0
6.	Karnal	0	0	0	0	0	0
7.	Kurukshetra	0	100	0	0	0	0
8.	Panipat	0	100	0	0	0	0
9.	Yamunanagar	0	100	0	0	0	0

	Total	5000	1000	1400	0	0	0
7)	**Jharkhand**						
1.	Garhwa	2000	4500	0	0	100	500
2.	Dumka	3000	3500	0	0	0	0
3.	Dhanbad	3000	2500	500	0	0	0
4.	Giridih	3000	2500	0	0	0	500
5.	Godda	0	2500	0	0	200	0
6.	Gumla	2000	2500	0	0	0	0
7.	Hazaribagh	5000	3500	500	0	0	0
8.	Koderma	5000	2500	0	0	0	0
9.	Latehar	3000	2000	0	0	200	0
10.	Lohardaga	2000	3500	0	0	0	0
11.	Pakur	0	2000	0	0	0	0
12.	Palamau	4000	5000	1000	0	200	500
13.	Ranchi	5000	5000	1000	0	0	500
14.	Sahibganj	0	2500	0	0	200	0
15.	Simdega	2000	2500	500	0	0	0
16.	Singhbhum (West)	4000	2500	0	0	300	500
17.	Singhbhum (East)	4000	2500	0	0	0	500
	Total	**47000**	**51500**	**3500**	**0**	**1200**	**3000**
8)	**Karnataka**						
1.	Belgam	0	0	2000	0	0	0
2.	Bagalkot	4000	0	3000	0	0	0
3.	Belgaun	4000	0	0	0	0	0
4.	Bellary	4000	6000	0	0	0	0
5.	Bidar	12000	7000	3000	0	0	0
6.	Bijapur	7000	8000	0	0	0	0
7.	Chitradurga	2000	6000	0	0	0	0
8.	Dharwad	8000	0	2000	0	0	0
9.	Gadag	3000	0	3000	0	0	0
10.	Gulbarga	20000	20000	3000	0	0	0
11.	Hassan	5000	4000	0	0	0	0
12.	Haveri	3000	0	0	0	0	0
13.	Koppal	0	5000	0	0	0	0
14.	Mandya	5000	0	0	0	0	0
15.	Mysore	5000	0	0	4000	0	0
16.	North Kanara	0	0	0	0	0	0
17.	Raichur	4000	7000	0	0	0	0
18.	Tumkur	4000	5000	0	0	0	0

19.	Shimoga	0	0	500	500	0	0
20.	Yadgir	0	6000	0	0	0	0
	Total	**90000**	**74000**	**16500**	**4500**	**0**	**0**
9)	**Madhya Pradesh**						
1.	Ashok nagar	20000	0	0	6000	2400	0
2.	Annuppur	0	0	0	0	12000	500
3.	Betul	0	2500	0	500	0	500
4.	Bhind	0	0	0	0	0	500
5.	Chhatarpur	35000	0	900	10000	0	1000
6.	Chhindwara	0	3000	300	1000	0	500
7.	Datia	10000	3000	0	0	0	1500
8.	Damoh	35000	0	0	3000	3600	1000
9.	Dhar	20000	0	500	0	0	0
10.	Dindori	0	0	0	500	4000	1500
11.	Dewas	35000	3000	0	0	0	0
12.	Guna	25000	3000	0	0	0	0
13.	Gwalior	25000	2500	0	0	0	0
14.	Harda	25000	2500	2000	0	2400	0
15.	Hosangabad	20000	3000	2000	0	2400	0
16.	Indore	25000	500	0	0	0	0
17.	Jabalpur	20000	3000	0	800	3000	2000
18.	Jhabua	0	3000	0	500	0	0
19.	Katni	0	0	0	0	1500	500
20.	Mandla	0	0	0	0	1500	2500
21.	Mandsaur	0	0	1000	1500	0	0
22.	Narsimpur	30000	2000	300	1000	3400	1000
23.	Panna	25000	0	200	1000	4000	2000
24.	Raisen	35000	5000	0	0	900	1000
25.	Rajgarh	30000	2000	0	0	1200	0
26.	Ratlam	30000	2000	0	0	0	0
27.	Rewa	0	0	0	1000		0
28.	Sagar	20000	2500	0	3000	4000	1500
29.	Satna	20000	2500	500	2000	3000	0

30.	Sehore	35000	2500	1000	0	1000	0
31.	Seoni	0	0	0	0	0	1000
32.	Shajapur	20000	0	0	500	1000	0
33.	Shivpuri	30000	0	500	2000	0	0
34.	Sidhi	0	2000	0	0	0	0
35.	Tikamgarh	0	2000	800	6000	0	1000
36.	Ujjain	35000	4000	0	0	0	0
37.	Vidisha	35000	3000	0	5000	4000	0
	Total	640000	58500	10000	26400	30900	19500
10)	**Maharashtra**						
1.	Akola	20000	7000	3000	1000	0	0
2.	Ahmednagar	25000	8000	2000	1000	0	0
3.	Amravati	20000	9000	3000	500	0	0
4.	Aurangabad	25000	5000	1000	500	0	0
5.	Beed	10000	6000	1000	1000	0	0
6.	Buldhana	15000	6000	5500	5000	0	500
7.	Chandrapur	5000	6000	0	0	500	0
8.	Dhule	0	0	2000	1000	0	0
9.	Hingoli	5000	7000	0	1000	0	0
10.	Jalgoan	5000	0	4500	4000	0	0
11.	Jalna	0	9000	4000	1000	0	0
12.	Kolhapur	5000	0	0	3000	0	0
13.	Latur	20000	10000	2500	5000	0	500
14.	Nagpur	10000	5000	0	0	0	0
15.	Nanded	5000	5000	3000	6000	0	500
16.	Nasik	5000	0	0	1000	0	0
17.	Osmanabad	5000	10000	2000	6000	0	0
18.	Parbhani	5000	8000	4000	1000	0	0
19.	Pune	5000	3000	0	0	0	0
20.	Sangli	5000	3000	1000	1000	0	500
21.	Satara	5000	3000	500	0	0	0
22.	Solapur	5000	6000	0	0	0	500

23.	Washim	5000	6000	3000	3000	0	0
24.	Wardha	5000	8000	0	0	500	0
25.	Yavatmal	5000	10000	1000	1000	0	500
	Total	**220000**	**140000**	**45500**	**45000**	**1000**	**3000**
11)	**Manipur**						
1.	Churachandpur	500	0	0	0	300	0
2.	Chandel	500	**0**	0	0	0	0
3.	Bishnupur	500	0	**0**	**0**	**0**	0
4.	Imphal East	750	**0**	0	0	0	0
5.	Imphal West	750	0	**0**	**0**	**0**	**0**
6.	Senapati	500	**0**	0	0	600	0
7.	Thoubal	500	0	0	0	0	0
8.	Tamenglong	500	**0**	**0**	**0**	**0**	**0**
9.	Ukhrul	500	0	0	0	600	0
	Total	5000	0	0	0	1500	0
12)	**Odisha**						
1.	Berhampur	0	1000	0	0	0	0
2.	Bhadrak	0	0	0	0	1500	0
3.	Bolangir	**0**	**0**	2000	800	0	0
4.	Buragarh	0	0	2000	500	0	0
5.	Cuttack	**0**	**0**	5000	2000	1500	0
6.	Ganjam	0	500	4500	1000	0	0
7.	Jagatsinghpur	0	0	3000	0	0	0
8.	Jajpur	**0**	**0**	0	1000	0	0
9.	Kalahandi	0	0	1500	1000	1500	0
10.	Kendrapara	**0**	**0**	2500	1500	0	0
11.	Keonjhar	0	1000	1000	0	0	0
12.	Khurda	0	0	1000	0	0	0
13.	Koraput	**0**	**0**	0	0	1500	0
14.	Mayurbhanj	0	0	0	0	3000	0
15.	Navapara	**0**	**0**	0	1000	0	0
16.	Nayagarh	0	500	3000	500	0	0
17.	Puri	**0**	**0**	3000	1000	0	0

	Total	**0**	**3000**	**28500**	**10300**	**9000**	**0**
13)	**Punjab**						
1.	Ludhiana	0	0	1500	0	0	0
2.	Bhatinda	500	0	0	0	0	0
3.	Fazilka	500	0	0	0	0	0
4.	Firozpur	1000	0	0	0	0	0
5.	Gurdaspur	500	0	0	0	0	0
6.	Moga	0	0	3000	0	0	0
7.	Patiala	0	0	4500	0	0	0
8.	Sangroor	0	0	3000	0	0	0
9.	Fatehgarh sahib	0	0	3000	0	0	0
	Total	2500	**0**	15000	0	0	0
14)	**Rajasthan**						
1.	Ajmer	25000	0	8000	0	0	0
2.	Banswara	5000	500	1000	1000	0	0
3.	Barmer	0	**0**	5000	0	0	0
4.	Bhilwara	0	**500**	0	0	0	0
5.	Chitradurga	0	**500**	0	0	0	0
6.	Bikaner	25000	0	0	0	0	0
7.	Churu	30000	**0**	3000	0	0	0
8.	Dausa	5000	**0**	0	0	0	0
9.	Ganganagar	25000	0	5600	0	0	0
10.	Hanumangarh	30000	**0**	3000	0	0	0
11.	Jaipur	10000	1000	8000	0	0	0
12.	Jalwad	0	500	0	0	0	0
13.	Jalore	0	**0**	9000	0	0	0
14.	Jhunjhunu	30000	0	2000	0	0	0
15.	Jodhpur	0	**0**	9000	0	0	0
16.	Karauli	5000	**500**	0	0	0	0
17.	Kota	5000	**500**	0	2000	2000	0
18.	Nagaur	5000	0	20000	0	0	0
19.	Pali	5000	**0**	10000	0	0	0
20.	Sikar	10000	0	1000	0	0	0
21.	Tonk	5000	0	4000	0	0	0

22.	Udaipur	0	1000	0	0	0	0
	Total	**220000**	**5500**	**70600**	**3000**	**2000**	**0**
15)	**Tamil Nadu**						
1.	Coimbatore	0	1500	0	0	0	0
2.	Cudallore	0	0	0	4000	0	0
3.	Nagpatinam	**0**	**0**	3000	3000	0	0
4.	Namakaal	**0**	**0**	500	0	0	0
5.	Pudukottai	0	1500	500	600	0	0
6.	Thanajavur	**0**	**0**	1000	1000	0	0
7.	Thoothkudi	**0**	**0**	0	3000	0	0
8.	Tiruvarur	0	0	1500	3600	0	0
9.	Vellore	0	3000	0	0	0	0
10.	Villupuram	0	0	0	2000	0	0
	Total	**0**	**6000**	**16500**	**17200**	**0**	
16)	**Telangana**						
1.	Adilabad	3000	3000	1000	1000	0	0
2.	Karimnagar	0	5000	1500	0	0	0
3.	Khammam	0	5000	1500	1000	0	0
4.	Mehboobnagar	3000	5000	1500	0	0	0
5.	Medak	2000	0	4000	2000	0	0
6.	Nalgonda	0	3000	3000	1000	0	0
7.	Rangareddy	2000	10000	1000	1000		0
8.	Srikakulum	0	0	3000	4000	0	0
9.	Warangal	0	10000	2000	1000	0	0
10.	Nizamabad	3000	3000	0	0	0	0
	Total	**13000**	**44000**	**18500**	**11000**	**0**	**0**
17)	**Tripura**						
1.	Dhalai	0	0	300	0	0	0
2.	Gomati	0	0	0	0	0	0
3.	North (Tripura)	250	0	450	0	500	0
4.	South (Tripura)	250	0	450	0	500	0
5.	West (Tripura)	500	0	300	0	500	0
	Total	**1000**	**0**	**1500**	**0**	**1500**	**0**

18)	**Uttar Pradesh**						
1.	Agra	0	500	500	0	0	0
2.	Allahabad	0	1500	500	0	0	500
3.	Aligarh	0	1000	4000	0	0	0
4.	Amroha	0	500	0	0	0	0
5.	Auraiya	0	500	1000	0	0	0
6.	Azamgarh	0	0	0	0	0	1000
7.	Badaun	0	500	0	2000	0	0
8.	Bagpat	0	0	0	0	0	0
9.	Balrampur	0	250	0	2000	0	0
10.	Ballia	0	0	0	0	2000	0
11.	Banda	20000	2000	500	0	4000	0
12.	Barabanki	0	500	1000	0	0	0
13.	Basti	0	500	0	0	0	1000
14.	Behraich	0	0	0	0	4000	0
15.	Bijnour	0	0	0	0	0	0
16.	Bullandshahar	0	0	1500	0	0	0
17.	Chandauli	0	0	0	0	1000	0
18.	Chitrakoot	10000	3500	0	0	2000	0
19.	Etah	0	500	1000	1000	0	1500
20.	Etawah	0	1000	2000	1000	0	1000
21.	Faizabad	0	0	0	0	0	500
22.	Fatehpur	8000	1500	1000	500	0	0
23.	Firozabad	0	1000	500	500	0	0
24.	Gazipur	0	3500	0	0	1000	0
25.	Gonda	0	250	1500	0	1500	0
26.	Hardoi	0	250	0	3000	500	0
27.	Hamirpur	8000	2000	500	2000	5000	1500
28.	Jaunpur	0	500	0	0	0	500
29.	Jalaun	7000	2000	0	500	5000	10000
30.	Jhansi	2000	2000	500	3000	5000	4000
31.	Kanpur Dehat	3000	1000	1200	0	0	0
32.	Kaushambi	0	2000	0	0	0	0

33.	Kheri	0	0	0	0	1000	0
34.	Lalitpur	5000	2000	1000	15000	1000	6000
35.	Mahoba	7000	1500	1000	5000	3000	3000
36.	Mainpuri	0	2500	1000	0	0	0
37.	Mirzapur	5000	3500	0	0	500	0
38.	Moradabad	0	0	0	1500	0	0
39.	Muzaffarnagar	0	0	500	0	0	0
40.	Pratapgarh	0	500	500	1000	0	0
41.	Raebareli	0	500	500	1500	0	0
42.	Sahajahanpur	0	0	0	1000	2000	0
43.	Sitapur	0	250	0	1500	1000	0
44.	Sonbhadra	2000	2500	0	0	3000	0
45.	Shrivasti	0	0	0	0	2000	0
46.	Sultanpur	0	500	500	1000	0	1000
47.	Unnao	0	0	700	2000	0	0
	Total	**77000**	**42000**	**21900**	**47000**	**46500**	**27000**
19)	**West Bengal**						
1.	Birbhum	1000	0	0	0	600	0
2.	Burdwan	0	0	500	0	0	0
3.	Cooch-behar	0	0	500	500	0	0
4.	Malda	1000	**0**	500	1500	600	0
5.	Murshidabad	1000	0	500	1000	1400	0
6.	Nadia	1000	**0**	0	1000	1600	0
7.	North 24 Parganas	0	0	0	500	500	0
8.	South 24 Parganas	0	0	1000	0	0	0
9.	North Dinajpur	**0**	0	500	0	0	0
10.	West Dinapur	**0**	0	2550	0	0	0
	Total	**4000**	**0**	**6050**	**4500**	**4700**	**0**
	Grand Total	1205500	410500	263300	175300	112000	**61300**

Table 4: Districts within State wise Potential Area (ha) for Minor pulses in

Crop	State	Districts	Potential Area (ha)
Mothbean	Rajasthan	Barmer, Churu, Bikaner, Nagaour, Jodhpur, Pali, Jalore	1,00,000
	Gujarat	Kutch, Patan, Mehsana, Banaskantha, Surendranagar	15,000
	Maharashtra	Dhule, Solapur, Ahmednagar	5,000
	Karnataka	Bijapur, Belgaum, Raichur	5,000
	Total		**1,25,000**
Horsegram	Karnataka	Mysore, Chamarajanagar, Hassan, Mandya	40,000
	Orissa	Bolangir, Kalahandi, Sundergarh	10,000
	Tamilnadu	Dharmapuri, Krishnagiri, Salem	10,000
	Chattisgarh	Korba, Jagdalpur, Ambikapur, Bastar, Kanker	10,000
	Maharashtra	Ahmednagar, Nasik, Pune, Dhule, Solapur	5,000
	Andhra Pradesh	Ananthapur	3,000
	Bihar	Sumal, Zamui, Purnia, Kisanganj, Arahasia	2,000
	Jharkhand	Palamu, Garwah, Chakra, Latehar	2,000
	Total		**82,000**
Cowpea	Karnataka	Mysore, Hsan, Tumkur, Gadag, Yadgiri, Raichur, Bellary	20,000
	Tamilnadu	Thoothukudi, Nagapttinam, Tirunelveli, Virudhnagar, Krishnagiri	10,000
	Kerala	Ernakulum, Kollam, Kottayam, Kozhikode, Wayanad, Thrissur, Thiruvananthpuram	10,000
	Andhra Pradesh	Guntur, Anantpur, Kurnool, Medak, Cuddapah	9,100
	Gujarat	Mehsana, Banaskantha, Sabarkantha, Anand, Patan	5,000
	Rajasthan	Sikar, Jhunjhunu, Ajmer, Jaipur	10,000
	Uttar Pradesh	Gorakhpur, Basti	1,000
	Total		**65,100**
	Grand Total		**2,72,100**

NAAS Strategy Workshop
Towards Self-sufficiency of Pulses in India
7-8 April, 2016

Convenors: Dr M.C. Saxena, Senior Advisor to DG, ICARDA, Gurgaon
Dr N.P. Singh, Director, ICAR-IIPR, Kanpur

Inaugural Session

Chief Guest	:	Dr R.S. Paroda, Chairman, TAAS, New Delhi
Chair	:	Prof Ramesh Chand, Member (Agriculture), NITI Aayog, New Delhi
Guests of Honour	:	Dr David J. Bergvinson, DG, ICRISAT, Hyderabad Dr S. K. Pattanayak, Secretary, DAC&FW, GoI, New Delhi Dr Gurbachan Singh, Chairman, ASRB, New Delhi Dr Shyam Bahadur Khadka, FAO Representative in India, New Delhi Dr J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi Dr B. Sharma, Former Head (Genetics), IARI, New Delhi

Technical Session I: Genetic Enhancement

Chair	:	Dr R.S. Paroda, Chairman, TAAS, New Delhi
Co-Chair	:	Dr J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi

Presentations

Value chain in pulses	:	Dr J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi
Frontier research in pulses	:	Dr Rajeev Kumar Varshney, Director (GLP), ICRISAT
Development of pigeonpea hybrid	:	Dr I.P. Singh, PC (Pigeonpea), ICAR-IIPR, Kanpur
Biofortified pulses	:	Dr Ashutosh Sarkar, Regional Coordinator, ICARDA, New Delhi
Panelists	:	Dr S.A. Patil, Chairman, Karnataka Krishi Mission, Dr B. Misra, Former VC, SKUAST, Jammu Dr P.M. Salimath, VC, UAS, Raichur

Technical Session-II: Productivity Enhancement

Chair	:	Dr Panjab Singh, President, FAARD, Varanasi
Co-Chair	:	Dr H.S. Gupta, DG, BISA, New Delhi

Presentations

Pulse varieties and protection	:	Dr R.R. Hanchinal, Chairman, PPV&FRA, New Delhi
Technologies in shelf	:	Dr N.P. Singh, Director, ICAR- IIPR, Kanpur
Insect-pest management	:	Dr H.C. Sharma, Principal Scientist, ICRISAT, Hyderabad
Management of viral diseases	:	Dr Naimuddin, Senior Scientist, ICAR-IIPR, Kanpur
Water management in pulses	:	Dr Man Singh, WTC, ICAR-IARI, New Delhi
Panelists	:	Dr Arvind Kumar, VC. RLBCAU, Jhansi
		Dr Anupam Varma, Vice President, NAAS, New Delhi
		Dr Masood Ali, Former Director, ICAR-IIPR, Kanpur

Technical Session III: Smart Farming

Chair	:	Dr David J. Bergvinson, DG, ICRISAT, Hyderabad
Co-Chair	:	Dr A.K. Sikka, DDG (NRM), ICAR, New Delhi

Presentations

Soil health & pulses	:	Dr J.C. Katyal, Former Vice Chancellor, CCSHAU, Gurgaon
CSA in pulses	:	Dr C. Srinivasa Rao, Director, CRIDA, Hyderabad
Forecasting models for biotic stresses	:	Dr C. Chattopadhyay, Director, NCIPM, New Delhi
Vertebrate pest management	:	Dr R.S. Tripathi, Jodhpur and Dr V.V. Rao, AINP-VPM, Hyderabad
Panelists	:	Dr B. Venkateswarlu, VC, VNMKVV, Parbhani

Technical Session IV: Harvest and Post harvest management

Guest of Honour	:	Dr T. Mohapatra, Secretary, DARE & DG, ICAR, New Delhi
Chair	:	Dr Gurbachan Singh, Chairman, ASRB, New Delhi
Co-Chair	:	Dr V.N. Sharda, Member, ASRB, New Delhi

Presentations

Mechanisation in pulses	:	Dr Indramani Mishra, Head, Agricultural Engineering, ICAR-IARI, New Delhi
Innovations in food chain of pulses	:	Dr S.K. Nanda, Head, FG&OP Division, ICAR-CIPHET, Ludhiana
Panelists	:	Dr Gajendra Singh, Former DDG (Agril Engg.) ICAR, Noida Dr Anwar Alam, Former VC, SKUAST, New Delhi Dr Nawab Ali, Former DDG (Agril. Engg.), ICAR, Bhopal Dr N.S. Rathore, DDG (Agril. Edn.), ICAR, New Delhi

Technical Session V: Trade and Policy

Chair	:	Shri A. Srivastava, Secretary, MFPI, New Delhi
Co-Chair	:	Dr A.K. Singh, DDG (Agril. Extn.), ICAR, New Delhi

Presentations

Pulse promotion schemes	:	Shri Sanjay Lohiya, JS, DAC & FW, New Delhi
Changing consumption patterns of pulses: trends and projections	:	Dr P.K. Joshi, Director, IFPRI, South Asia Office, New Delhi
Pulse marketing	:	Dr Amarendra Reddy, ICAR-IARI, New Delhi
Panelist	:	Shri N.K. Kathad, Gandhinagar

Technical Session VI: New Dimensions

Chair	:	Dr R.B. Singh, Immediate Past President, NAAS, New Delhi
Co-Chair	:	Dr N.K. Krishna Kumar, DDG (Hort. Science), ICAR, New Delhi

Presentations

Global pulse germplasm	:	Dr P.N. Mathur, Coordinator, Bioversity International and Dr K.C. Bansal, Director, NBPGR, New Delhi
Vegetable legumes	:	Dr P.M. Singh, Head (Vegetable Improvement), ICAR-IIVR, Varanasi
Pulses in non-traditional niches	:	Dr Sanjeev Gupta, PC, MULLARP, ICAR-IIPR, Kanpur
Cool season food legumes	:	Dr G.P. Dixit, PC (Chickpea), ICAR-IIPR, Kanpur

Panelists	:	Dr P.N. Bahl, Former DDG (Crop Science), ICAR, New Delhi
		Dr K.P. Viswanath, VC, MPKV, Rahuri
		Shri Mohan R. Bajikar, Agri House, Mumbai

Concluding Session: Way Forward

Chair	:	Dr S. Ayyappan, President, NAAS, New Delhi
Co-Chairs	:	Dr David J. Bergvinson, DG, ICRISAT, Hyderabad
		Dr R.R. Hanchinal, Chairman, PPV&FRA, New Delhi
Presentations	:	Dr M.C. Saxena, Gurgaon and Dr N.P. Singh, Kanpur, Conveners