AN ACCOUNT OF PULSES DEVELOPMENT

GOVERNMENT OF INDIA
DEPARTMENT OF AGRICULTURE, CO-OPERATION &FARMERS WELFARE

1.0 Background

Pulses is integral part of Indian diet, especially for vegetarian population who relies mainly on pulses to meet the protein requirement.Globally grown in an area of 807.54 lakh ha with production of 730 lakh tonnes at productivity level of 892 kg/ha, India ranks first in respect of area and production with global share of 35% area and 25 % production. At the productivity front, India ranks at IXth position.

1.1 Global Scenario: Total Pulses

Globally pulses are grown in an area of 807.54 lakh ha with production of 730 lakh tonnes at productivity level of 892 kg/ha, India ranks first in respect of area and production with global share of 35% area and 25 % production. At the productivity front, India ranks at IXth position. The top 10 countries in respect of area, production and yield is given in Table.

Table 1: Global Scenario

Country	**Area** (LAKH HA)		Country	**Production** (LAKH TONS)		Country	**YIELD** (kg/ha)
	Area	% to world		Production	% to world		
India	281.7	35	India	183.11	25	USA	1920
Niger	48.41	6	Canada	61.05	8	China	1498
Myanmar	38.88	5	Myanmar	54.37	7	Russian fed.	1395
Nigeria	33.3	4	China	44.73	6	Myanmar	1369
China	28.845	4	Brazil	29.46	4	Australia	1310
Brazil	28.55	4	Australia	27.04	4	Brazil	971
Canada	24.22	3	Nigeria	25.6	4	Nigeria	806
Australia	19.18	2	USA	22.33	3	Canada	648
Russian federation	17.01	2	Russian federation	20.84	3	India	638
Pakistan	14.80	2	Niger	13.63	2	Niger	305
Others	272.65	33	Others	247.91	34		
World	**807.54**			**730.07**		**892**	

(Source: FAO Statistics, 2013)

1.2 National Scenario

India is the largest producer, processor and consumer of pulses with an annual normal acreage of 245 lakh ha, production175 lakh tons at yield levels of 714 kg/ha. Pulses are grown in all three seasons in all 29 states but the major producing states are Madhya Pradesh (24.7%), Maharashtra (15.1%), Rajasthan (12.4%),Uttar Pradesh (11.8%), Andhra Pradesh (8.3%) and Karnataka (7.6%). Chickpea is the major pulse crop followed by Tur and Moong.

Table 2: State-wise-Total Pulses

(Lakh tons)

STATE	2015-16*	2014-15	% Change (+ -)
Madhya Pradesh	51.65	47.05	**9.78**
Maharashtra	15.18	17.38	**-12.66**
Rajasthan	21.60	19.50	**10.77**
Uttar Pradesh	15.73	14.47	**8.71**
Andhra Pradesh	11.82	11.56	**2.25**
Karnataka	13.05	14.88	**-12.30**
Tamil Nadu	6.16	6.47	**-4.79**
Jharkhand	5.52	5.97	**-7.54**
Gujarat	5.20	5.81	**-10.50**

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Andhra Pradesh	Pigeonpea	LRG-41, PRG-158 & ICPH-2740	LRG-41, PRG-158
	Urdbean	PU-31, LAM, TM-76-2	PU-31, LBG-752 & TM-76-2
	Moongbean	LGG-460, TM-96-2	LGG-460, TM-96-2
	Chickpea	JG-11, JAKI-9218 & PBH-4	JG-11, JAKI-9218 & PBH-4
Karnataka	Pigeonpea	BRG-1, BRG-2	ICP 8863 (Maruthi), ICPL 87119 (Asha), ICPL 87 (Pragathi)
	Urdbean	TAU-1, T-9	Kargane-3, T-9, LBG-625
	Moongbean		PS-16, Pusabaisaki
	Chickpea	Annigeri-1, JG-11	Annigeri-1, JG-11, KAK-2, Vishal
	Kulthi	Hebbal Local	KBH-1, PHG-9
Gujarat	Pigeonpea	Gujarat Tur-100, Gujarat Vegetable Tur-1	BDN-2
	Urdbean	TPU-4, Gujarat Urd-1	T-9
	Moongbean	Gujarat Mung-3, CO-4	GM-4, K-851
	Chickpea	GG-1, Chaffa, Dahod Yellow, ICCC-4, Gujarat Junagarh Gram-3	Gujarat Gram-4

2.2: Pest Outbreaks–

The loss caused due to insect pest varies from crop to crop, in pigeonpea losses reported up to 60% whereas in chickpea it is upto 90%. The details of pest, % damage and affected are enlisted below:

PIGEONPEA PEST	**DAMAGE Per Cent**	**AFFECTED AREA**	
		MODERATE DAMAGE	**HIGH DAMAGE**
Pod borer complex	40-60	U P, Bihar, W B, Jharkhand	M S, Guj, KN, A P, T N
Pod fly complex	10-50	U P, Bihar, Jhark, Pun, Hary,	U P, Bihar, Jharkhand, W B
Wilt	10-15	UP, Bihar, Jhar. Guj, T N, WB	M S, KN, AP, MP
Phytopathora Blight	5-10	M S, W B	U P
SMV	10-15	Gujarat, A P	U P, Bihar, M.S., KN, T N
Root knot		M.P.	U P, Bihar, Gujarat
Cyst Nematode		M.S.	M S, A P, T N
CHICKPEA PEST			
Pod borer complex	10-90	Madhya Pradesh, Karnataka, Rajasthan, Maharashtra, Andhra Pradesh, Gujarat, Telanagana	
Wilt /Root rot	20-25		
Cut worm	5-30		
Termites	5-15		
Semilooper	0-10		

2.3Yield Gap:

The Front Line Demonstrations, one of the component of NFSM implemented through ICAR/SAUs/KVks shows the yield gap > 37% compare to state yield. The crop-wise/state-wise FLD and state yield is given in **Table 6**.

Table 6 : Crop-wise/state-wise FLD and state yield

Crop/State	YIELD (kg/ha)			
	FLD	State Average	GAP	
			Actual	%
Pigeonpea (Short Duration)				
Maharashtra	890	766	124	16.19
Madhya Pradesh	1159	632	527	83.39
Gujarat	1427	1008	419	41.57
Haryana	1463	1094	369	33.73
Karnataka	**No FLDs has been conducted in the states**			
Uttar Pradesh				
Andhra Pradesh				
Average	**1142**	**833**	**309**	**37.10**
Pigeonpea (Medium Duration)				
Maharashtra	1404	766	638	83.29
Karnataka	1484	555	929	167.39
Madhya Pradesh	1198	632	566	89.56
Gujarat	2444	1008	1436	142.46
Andhra Pradesh	1329	449	880	195.99
Chhattisgarh	1276	497	779	156.81
Jharkhand	1566	771	795	103.11
Tamil Nadu	764	724	40	5.57
Uttar Pradesh	**No FLDs has been conducted**			
Average	**1433**	**675**	**758**	**112.25**
Pigeonpea (Long Duration)				
Bihar	2123	1301	822	63.18
Jharkhand	1235	771	464	60.18
Uttar Pradesh	1724	884	840	95.02
Average	**1694**	**985**	**709**	**71.92**
Moong (Kharif)				
Rajasthan	912	411	501	121.90
Madhya Pradesh	**No FLDs has been conducted**			
Maharashtra	660	496	164	33.06
Gujarat	868	460	408	88.70
Telangana	**No FLDs has been conducted**			
Karnataka	684	199	485	243.72
Odisha	700	219	481	219.63
Jharkhand	850	550	300	54.55
Uttar Pradesh	625	487	138	28.34

Average	**786**	**453**	**333**	**73.61**
Moong (Rabi)				
Andhra Pradesh	841	425	416	97.88
Karnataka	735	304	431	141.78
Tamil Nadu	766	303	463	152.81
Average	**781**	**344**	**437**	**126.94**
Moong (Rice Fallows)				
Andhra Pradesh	814	425	389	91.53
Karnataka	962	304	658	216.45
Average	**888**	**365**	**524**	**143.62**
Urdbean (Kharif)				
Madhya Pradesh	No FLDs has been conducted			
Uttar Pradesh	856	551	305	55.35
Rajasthan	818	478	340	71.13
Maharashtra	590	534	56	10.49
Jharkhand	883	660	223	33.74
West Bengal	1164	680	484	71.18
Gujarat	710	651	59	9.06
Andhra Pradesh	856	481	375	77.96
Chhattisgarh	700	292	408	139.73
Karnataka	762	298	464	155.70
Odisha	669	290	379	130.69
Average	**830**	**494**	**336**	**68.08**
Urdbean (Rabi))				
Andhra Pradesh	1310	623	687	110.27
Karnataka	755	438	317	72.37
Tamil Nadu	838	356	482	135.39
Average	**968**	**472**	**495**	**104.87**
Urdbean (Rice fallows)				
Andhra Pradesh	637	623	14	2.25
Karnataka	967	438	529	120.78
Average	**802**	**531**	**272**	**51.18**
Chickpea				
Madhya Pradesh	1683	951	732	76.92
Rajasthan	1714	721	993	137.73
Karnataka	1130	601	529	88.02
Maharashtra	1500	816	684	83.85
Andhra Pradesh	1840	1271	569	44.75
Uttar Pradesh	1821	942	879	93.31
Chhattisgarh	1027	908	119	13.11
Jharkhand	1326	981	345	35.13
Gujarat	1984	1050	934	88.98
Bihar	1470	1072	398	37.13
Average	**1341**	**867**	**474**	**54.68**

Lentil				
Uttar Pradesh	1523	799	724	90.61
Madhya Pradesh	932	424	508	119.72
Bihar	1591	878	713	81.21
West Bengal	1406	791	615	77.75
Rajasthan	1285	917	368	40.13
Chhattisgarh	652	322	330	102.48
Jharkhand	1103	769	334	43.43
Punjab	1133	673	460	68.35
Average	**1044**	**655**	**389**	**59.43**

2.4 Seed Replacement Rate (SRR):

The SRR in pulses is ranging from 20% in gram to 34 % in urd which is lower as compared to other crops.

Crop	SRR (%) (2011-12)
Gram	19.35
Urd	34.41
Moong	30.29
Arhar	22.16
Lentil	22.00

Source: Seednet, Seed Division, Min. of Agri. & FW, New Delhi

2.5 Production Gap

To meet out the demand of Pulses, on an average 40 lakh tonnes of different pulses has to be imported from other countries. The major import share belongs to peas (39%) followed by lentil (17%), urd/mung (16%), pigeonpea (13%) and chickpea (12%). A negligible export of 2.55 lakh tones on an average is also made with major share of chickpea (94%) (**Table 7**)

Table 7: Availability of total Pulses & Production Gap (12th Plan Ave: 2012-13 to 2014-15)

(Quantity in 000 tons)

Crop	Production	Import	Export	Total Availability	Production Gap
Pigeon pea	2992.10	515.74	0.96	3506.88	514.78
Chickpea	8509.57	464.21	239.64	8734.13	224.57
Lentil	1075.75	677.17	3.25	1749.67	673.92
Peas	881.85	1551.07	1.78	2431.15	1549.30
Urd/Moong	3271.97	629.95	2.51	3899.41	627.44
Total Pulses	**18262.23**	**4026.31**	**255.78**	**22032.76**	**3770.52**

Source: Ministry of Commerce & DES, Ministry of Agriculture & Farmers Welfar

3.0 Import & Export of Pulses:

To meet the demand of pulses on an average 40.26 lakh tons of different pulses are being imported from other countries. The detail of import/export is given in **Table 8**.

Table 8: Import and export of pulses (Qty in 000 tons)

Crop	Production	Import	Export	Total Availability	Production Gap
Pigeonpea	2992.10	515.74	0.96	3506.88	514.78
Chickpea	8509.57	464.21	239.64	8734.13	224.57
Lentil	1075.75	677.17	3.25	1749.67	673.92
Peas	881.85	1551.07	1.78	2431.15	1549.3
Urd+Moong	3271.97	629.95	2.51	3899.41	627.44
Total Pulses	18262.23	4026.31	255.78	22032.76	3770.53

4.0 Government Efforts for Increase the Production of Pulses

To increase the production and productivity of Pulse, the government is implementing the NFSM-Pulses schemes in 29 states of the country. During 2015-16, a total Rs. 1553.56 lakh has been allocated to the states including additional allocation of Rs. 311.23 lakh. The government also increase the MSP for pulses this year with additional bonus. The comparative prices (MSP) from 2011-12 to 2015-16 is given in **Table 9.**

Table 9: MSP of Pulses **(Rs /qtl.)**

Pulses/Year	2011-12	2012-13	2013-14	2014-15	2015-16*
Tur	3200	3850	4300	4350	4625
Gram	2800	3000	3100	3175	3500
Moong	3500	4400	4500	4600	4850
Urad	3300	4300	4300	4350	4625
Lentil	2800	2900	2950	3075	3400

*Additional bonus Rs 200/quintal each in Tur, Urd and Moong and Rs75/quintal each in Gram &Lentil

4.1 Developmental Issues

- Low Productivity Levels-Pigeonpea, MULLaRP Crops.
- Agronomic Packages/Standardization of technology - For varied AES, viz. Rainfed, Ghats, Hill regions, Uplands, Rice bunds
- Varietal breakthrough- Short duration varieties for various cropping systems.
- A more transparent and authentic information on hybrid pigeon pea and also the seed production knowledge.
- Delineation of potential inter cropping areas.
- Zone specific inter cropping recommendations and crop combinations (varieties, package) in view of climatic scenario.

4.2 State specific issues

States	Issues
Odisha	➢ Kharif- High rainfall and excess moisture; Rabi- moisture stress and low temperature. ➢ Soil Acidity (>70% soils) resultantly low OC, N, Ca, Mg, B, Mo and high concentration of Fe, Al, Mn inhibiting microbial growth/ activity. ➢ Gradually deteriorating Canal irrigated lands. ➢ Deterioration of soil structure in Rice fallows due to puddling ➢ Quality seeds, low SRR- 1.8%. ➢ Need varieties of pigeonpea (early maturing); mung and urd (YMV and cold tolerant).
Madhya Pradesh	➢ Need pigeonpea technology on **ridge-furrow** as intercrop with soybean to **encounter excessive moisture stress.** ➢ Standardization of pigeonpea transplanting/bund cultivation. ➢ Integrated Pest Management Approach- Knowledge/awareness. ➢ Promotion of pigeonpea as climate resilient crop. ➢ Promotion of drip irrigation in pigeonpea with *ridge and furrow planting* as effective preventive management against low temperature. ➢ Exploitation of heterosis by introduction of mid duration hybrids.
Tamil Nadu	
a. Redgram	➢ Effective IPM modules to control of pod borer. ➢ Standardization and advancement in transplantation technique. ➢ Technology to increase the pod formation
b. Urd/Moong	➢ Conduction of adaptation trials of central released varieties for suitability to TN to enhance productivity. ➢ Need suitable replacement for existing urd (variety ADT 3 ADT 5) and Moong for rice fallow in delta districts of state to increase yield.
Uttar Pradesh	➢ Re-notification of *old promising varieties.* ➢ Promoting line sowing. ➢ Inter-cropping Agronomic modules to increase pulses during summer/Zaid.

4.3 Constraints in Pulses Cultivation

4.4 Constraints

4.4.1 **Climatic factor:** Major area of pulses under *rainfed* condition therefore their productivity is dependent on amount and distribution of rainfall. Rainfall intensity and distribution leads to vulnerability of *kharif* pulses to water stagnation (oxygen stress) and *rabi* pulses subjected to water deficit. Extreme weather conditions such as sudden shifting of temperatures i.e. low and high temperature beyond threshold level of tolerance cause flower abortion and hasten the reproductive period and lower grain yield Occurrence of mid-season cold waves and terminal heat during winter season has also been causing losses to crop productivity of rabi pulses in many regions. High temperature adversely affects productivity of winter pulses

4.4.2 Edaphic factor: Pulses are most sensitive to water logging condition, in black cotton soil in *kharif* season water logging situation results in poor aeration and failure of crop.

4.4.3 Insects and diseases: Chickpea productivity mainly governed by pod borers (*Helicoverpaarmigera*), fusarium wilt, root rots, and ascochyta blight. The major constraints to productivity in pigeonpea are biotic stresses such as pod borer, pod fly, Fusarium wilt, and sterility mosaic disease. Similarly, pod borer, aphids, cutworm, powdery mildew, rust and wilt are the major pests and diseases affecting lentil production.

4.4.4 Lower productivity: As compared to cereals, pulses have low yield potential, beside this the farmers also allocate low fertile area for pulses cultivation and do not give proper nutrition to crop resulting in non-expression of their potential ultimately lower productivity.

4.4.5 Irrigation availability: Mainly grown in *rainfed* area, especially in *rabi* season, the yield is limited by scarcity water. Farmers insure on winter rainfall but the last decade the Variability in climatic conditions such as high temperature and rainfall(intensity and amount) in winter season drastically affected pulses yield. We cannot avoid climatic condition but availing irrigation facility to pulses at their critical period of irrigation surly increase pulses production.

4.4.6 Poor Seed Replacement: Availability of good quality seeds and high seed replacement rate form the basis of higher productivity. Unfortunately, poor seed replacement rate in pulses is one of the major issues related to low yield.

4.4.7 Varietal release profile-notification during last 10 years

Table 10: Varietal release profile-notification during last 10 years (2006 to 2015)

Crop	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Arhar	2	6	4	3	-	1	2	3	2	1	24
Urd	2	-	4	4	4	3	3	1	3	1	25
Moong	3	2	2	4	4	3	3	1	2	-	24
Gram	7	11	5	3	7	1	6	5	2	2	49
Lentil	3	2	1	3	4	2	1	1	1	-	18
Peas	3	3	5	1	2	3	1	-	2	-	20

4.4.8: Limited -Varietal choice during last 10 years

Table11: Limited -Varietal choice during last 10 years (2006 to 2015)

State/Crop	Arhar	Urd	Moong	Chickpea	Lentil	Peas
Maharashtra	7	3	2	10	1	2
Rajasthan	-	5	4	16	2	4
A.P.	6	8	3	1	-	-
Karnataka	5	5	4	3	-	-
Gujarat	4	1	-	7	-	-
Odisha	2	6	2	1	-	-
M.P.	4	2	-	18	1	2
U.P.	2	7	4	7	6	10
Bihar	2	2	1	1	1	3
Tamil Nadu	2	8	3	1	-	-

5.0 Government Initiatives for Enhancing Pulses Production

- More than 50 % allocation for NFSM-Pulses.
- At least 30 % of cluster demonstration of rice under NFSM and BGREI- cropping system approach to increase area under pulses particularly rice fallows.
- Inclusion of planting of pigeon pea on rice bunds in cafeteria of cluster demonstration of rice (194 districts of 25 states under NFSM and 118 districts of 7 states under BGREI).
- Pulses as intercrop with cereals, oilseeds and commercial crops.
- Involvement of ICAR/SAU/CGIAR institutes to address various researchable issues.
- FLDs of pulses –IIPR through its AICRP centers.
- Involvement of KVKs for cluster frontline demonstrations –to create awareness and seed of newer varieties.
- Formation of Farmer-Producer Organization (FPO)-SFAC.
- Primary processing of pulses- Mini Dal Mills.
- **Value Chain Integration of Small Producers**

Table 12: Value Chain Integration of Small Producers

Activities to be covered	Incentive to	Implementing agencies	Cost norms
Establishment of Dal mills	❖ Farmer ❖ Farmers group ❖ Registered FPO	SFAC Similar organizations at Centre/State level	Rs. 10.00 lakhs, or 30% of the total cost, whichever is lower, as one time support
Branding and marketing of milled pulses	❖ Registered FPO	SFAC Similar organizations at Centre/State level	@Rs.5.00 lakh per FPO, for one time support only
Marketing support (local)	❖ un-registered farmer groups ❖ SHGs ❖ SHG federation	SFAC Similar organizations at Centre/State level	Rs.2.00 lakh per group of 15 farmers for one time support only
Set up and equip. procurement centres to grade and processing	❖ Registered FPOs	SFAC Similar organizations at Centre/State level	Rs.5.00 lakh per FPO for one time support only
Forming and strengthening of Farmer Producer Organizations (FPOs) may offer collective strength Seed production and seed procurement, Access to credit and improved technologies Reduction in transaction costs, Facilitation value addition, Tapping high value markets			

6: Central Initiatives under NFSM-Pulses 2016-17

Initiative	Agency /institutes
Creation of seed hubs	• 150 (ICAR/SAUs and KVKs) • Total seed to be Produce - 1.50 lakh qtls (1000x150) • Allocation - Rs. 75 crore
Cluster frontline demonstrations of pulses	• Krishi Vigyan Kendras (KVKs) • Allocation - Rs. 75 crore
Strengthening of production units of bio-fertilizers and bio-control	SAUs
Enhancement of breeder seed production	• Strengthening of infrastructure at ICAR/SAUs • Allocation: Rs. 10 Crore
Incentive for seed production	• State and National Seed agencies • @ Rs. 25 /- per kg for new varieties • Allocation of Rs. 200 crore
Seed Minikits Programme	• Allocation: Rs. 150 Crore
Buffer Stock of Pulses	• Allocation: Rs. 1100 Crore
FLD- IIPR, KANPUR	• Allocation: Rs. 0.98 Crore
NFSM-PULSES	• RS. 1100 Crore