



**STANDING COMMITTEE ON AGRICULTURE, ANIMAL
HUSBANDRY AND FOOD PROCESSING**
(2022-23)

SEVENTEENTH LOK SABHA

**MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION)**

ON THE SUBJECT

**'RESEARCH AND DEVELOPMENT IN FARM MECHANIZATION FOR
SMALL AND MARGINAL FARMERS IN THE COUNTRY'**

FIFTY-EIGHTH REPORT



**LOK SABHA SECRETARIAT
NEW DELHI
JULY, 2023/ASHADHA, 1945 (SAKA)**

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Presented to Lok Sabha on	21.07.2023
Laid on the Table of Rajya Sabha on	21.07.2023



**LOK SABHA SECRETARIAT
NEW DELHI
JULY, 2023/ASHADHA, 1945 (SAKA)**

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**COMPOSITION OF THE STANDING COMMITTEE ON AGRICULTURE, ANIMAL
HUSBANDRY AND FOOD PROCESSING (2022-23)**

Shri P.C. Gaddigoudar- Chairperson

MEMBERS

LOK SABHA

2. Shri Horen Sing Bey
3. Shri A. Ganeshamurthi
4. Shri Kanakmal Katara
5. Shri Abu Taher Khan
6. Shri Ram Mohan Naidu Kinjarapu
7. Shri Mohan Mandavi
8. Shri Devji Mansingram Patel
9. Smt. Sharda Anilkumar Patel
10. Shri Bheemrao Baswanthrao Patil
11. Shri Shriniwas Dadasaheb Patil
12. Shri Vinayak Bhaurao Raut
13. Shri Pocha Brahmananda Reddy
14. Shri Rajiv Pratap Rudy
15. Mohammad Sadique
16. Shri Devendra Singh *alias* Bhole Singh
17. Shri Virendra Singh
18. Shri V.K. Sreekandan
19. Shri Ram Kripal Yadav
20. VACANT[#]
21. VACANT^{*}

RAJYA SABHA

22. Smt. Ramilaben Becharbhai Bara
23. Shri Masthan Rao Beeda
24. Dr. Anil Sukhdeorao Bonde
25. Shri S. Kalyanasundaram
26. Shri Surendra Singh Nagar
27. Shri Kailash Soni
28. Shri Randeep Singh Surjewala
29. Shri Ram Nath Thakur
30. Shri Vaiko
31. Shri Harnath Singh Yadav

** Vacant w.e.f. 10.10.2022 due to demise of Shri Mulayam Singh Yadav on 10.10.2022 vide Bulletin- Part II, Para No. 5316 dated 14.10.2022.*

Vacant w.e.f.29.04.2023 due to disqualification of Shri Afzal Ansari from Membership of Lok Sabha w.e.f. 29.04.2023.

SECRETARIAT

- | | | | |
|----|----------------------------|---|----------------------|
| 1. | Shri Shiv Kumar | - | Additional Secretary |
| 2. | Shri Uttam Chand Bharadwaj | - | Director |
| 3. | Shri S. Vijayaraghavan | - | Executive Officer |

INTRODUCTION

I, the Chairperson, Standing Committee on Agriculture, Animal Husbandry and Food Processing (2022-23), having been authorized by the Committee to submit the Report on their behalf, present this Fifty-Eighth Report (Seventeenth Lok Sabha) on the Subject 'Research and Development in Farm Mechanization for Small and Marginal Farmers in the Country' pertaining to the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education).

2. The Standing Committee on Agriculture, Animal Husbandry and Food Processing had selected the Subject for examination during 2020-21. The Committee again selected the Subject for examination during 2021-22 and 2022-23. The Committee took briefing from the representatives of the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education) on 23rd August, 2022. Evidence of the representatives of the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education) was taken by the Committee in their Sitting held on 2nd September, 2022. The Report on the Subject was considered and adopted by the Committee at their Sitting held on 14 July, 2023.

3. For facility of reference and convenience, the Recommendations / Observations of the Committee have been printed in bold letters in Part-II of the Report.

4. The Committee wish to express their thanks to the representatives of the Department of Agricultural Research and Education for appearing before the Committee and furnishing requisite information in connection with the examination of the subject.

5. The Committee would also like to place on record their deep sense of appreciation for the invaluable assistance rendered to them by the Officials of Lok Sabha Secretariat attached to the Committee.

NEW DELHI;
14 July, 2023
23 Ashadha, 1945 (Saka)

P.C. GADDIGOUDAR
Chairperson,
Standing Committee on Agriculture,
Animal Husbandry and Food Processing

CHAPTER- I

INTRODUCTION

Agriculture Mechanization is an essential input to modern agriculture to increase the productivity and for making judicious use of other inputs like seeds, fertilizers, chemicals & pesticides and natural resources like water, soil nutrients etc. besides reducing the human drudgery and cost of cultivation. Agriculture Mechanization also helps in improving safety and comfort of the agricultural worker, improvements in the quality and value addition of the farm produce and also enabling the farmers to take second and subsequent crops making Indian agriculture more attractive and profitable. It also helps the Indian farming to become commercial instead of subsistence.

- 1.2. The Government has adopted several developmental programmes, schemes, reforms and policies that focus on higher income for the farmers. Department of Agricultural Research and Education/Indian Council of Agricultural Research (DARE/ICAR) provides scientific and technological support for enhancing production and productivity for sustainable agriculture through innovative techniques/approaches. DARE/ICAR through their research, education and extension programmes are committed for transforming Indian agriculture from food self-sufficiency to surplus for sale enhancing profitability.
- 1.3. ICAR with 113 Institutes spread across the country, is one of the largest National Agricultural Research Systems in the world. Nation is celebrating 75 years of its independence as Azadi Ka Amrit Mahotsav. DARE/ICAR had planned various agri-related activities to be undertaken for 75 weeks preceding 15 August 2022. These include awareness campaigns and lectures by eminent persons on the thematic areas for reaching out to maximum stakeholders particularly farmers on various new developments in different Sectors of Agriculture.
- 1.4. India accounts for only about 2.4% of the world's geographical area and 4% of its water resources, but has to support about 17% of the world's human

population and 15% of the livestock. Agriculture is an important sector of the Indian economy, accounting for approximately 20% of the nation's GDP. Agriculture in India is currently growing at an average compound annual growth rate (CAGR) of 2.8%. About half of the population relies on Agriculture as its principal source of income. Accelerating the growth of agriculture production is, therefore, necessary not only to meet the rising demand for food, but also to increase incomes of those dependent on agriculture and thereby ensure inclusiveness of growth and progress in our society.

CULTIVABLE LAND

1.5. As per the Land Use Statistics 2018-19, the total geographical area of the country is 328.7 Million Hectares, of which 139.3 Million Hectares is the reported net sown area and 197.3 Million Hectares is the gross cropped area with a cropping intensity of 141.6%. The net area sown works out to be 42.4% of the total geographical area. The net irrigated area is 71.6 Million Hectares.

FARM HOLDINGS

1.6. When asked by the Committee to give details of the Number of Farmers, Small and Marginal Farmers in the country during 2020-21 and 2021-22 State and Union Territory wise, the Department in its written reply stated as under:-

The 11th Agricultural Census (2021-22) has been launched in July 2022 and field work is expected to start in August 2022. Agricultural census data (2015-16) regarding number of holdings (marginal, small, small-medium, medium and large) and their average land holding were given as follows:

Sl. No.	Size Group	Agriculture Census 2015-16		Percentage of holdings to total holdings	Percentage of area operated to total area	Average Operated area per Holding (ha.)
		Number of Holdings (in '000)	Area Operated (in '000 ha.)			
1.	Marginal (below 1.00 ha.)	100251	37923	68.45	24.03	0.38
2.	Small (1.00-2.00 ha.)	25809	36151	17.62	22.91	1.40
3.	Semi – medium (2.00-4.00 ha.)	13993	37619	9.55	23.84	2.69
4.	Medium (4.00-10.00 ha.)	5561	31810	3.80	20.16	5.72
5.	Large (10.00 ha. & above)	838	14314	0.57	9.07	17.07
	Total	146454	157817	100.00	100.00	1.08

The small and marginal holdings of less than 2 Hectares account for 86% of the total operational holdings and 47% of the total operated area. The average farm size in India is small (1.08 ha).

- 1.7. As per Agriculture Census (2015-16), State wise number and area of Operational Holdings of all Groups was given as under:

S. No.	State/UTs	2015-16	
		Number (Number in '000)	Area (Area in '000 ha)
1.	A&N Islands	12	21
2.	Andhra Pradesh	8524	8004
3.	Arunachal Pradesh	113	380
4.	Assam	2742	2976
5.	Bihar	16413	6457
6.	Chandigarh	1	1
7.	Chhattisgarh	4011	4992
8.	D & N Haveli	15	21
9.	Daman & Diu	8	3
10.	Delhi	21	29
11.	Goa	75	82
12.	Gujarat	5321	9978
13.	Haryana	1628	3609
14.	Himachal Pradesh	997	944
15.	Jammu & Kashmir	1417	842
16.	Jharkhand	2803	3091
17.	Karnataka	8681	11805
18.	Kerala	7583	1395
19.	Lakshadweep	10	3
20.	Madhya Pradesh	10003	15670
21.	Maharashtra	15285	20506
22.	Manipur	150	172
23.	Meghalaya	232	300
24.	Mizoram	90	112
25.	Nagaland	197	956
26.	Odisha	4866	4619
27.	Puducherry	34	21
28.	Punjab	1093	3954
29.	Rajasthan	7655	20873
30.	Sikkim	72	91
31.	Tamil Nadu	7938	5971
32.	Telangana	5948	5972
33.	Tripura	573	282
34.	Uttar Pradesh	23822	17450
35.	Uttarakhand	881	747
36.	West Bengal	7243	5487
	TOTAL	146454	157817

PRESENT STATUS OF MECHANIZED FARMING

- 1.8. Farm mechanization reduces the cost of cultivation and increases productivity through efficient use of other inputs and natural resources. The penetration of powered machines in various farm activities is assessed in the range of 40 to 45 percent (NABARD, 2018). Mechanization in farm operations for major crops in India in 2019-20 has been 70, 38, 31 and 32 percent in seed bed preparation, sowing/planting/transplanting, weeding - interculture & plant protection and harvesting & threshing, respectively.
- 1.9. To promote an inclusive growth of farm mechanization in the country, a Sub Mission on Agricultural Mechanization (SMAM) was launched in the year 2014-15. Under the scheme, assistance is given to State Governments for providing training and demonstration of agricultural machinery and assist farmers in procurement of various agricultural machinery and equipments as also for setting up of Custom Hiring Centre (CHC). During 2014-15 to 2020-21, a total of 27828 CHC and during 2020-21 alone, 9432 CHC were established under the SMAM scheme.

ACHIEVEMENTS IN AGRICULTURE

- 1.10. During the course of evidence held on 23.8.2022 regarding achievements in the field of Agriculture, the Secretary, Department of Agricultural Research and Education stated as under:-

“Sir, there is overall achievements in Agricultural Development. During the last 75 years, we succeeded not only in Green Revolution but also white revolution, blue revolution, golden revolution, Brown revolution, grey revolution were a great success. Now, we are talking about rainbow revolution. There is considerable increase in the production and productivity. Our production has increased from 6 percent to 70 percent. Our net cultivated area has been increased from 1.1. to 1.3 times. There is no significant change in the cultivable area but our productivity and production has been increased from six to 70 times. As the Hon’ble Chairperson has said that our farm’s size is small and its average is 1.08

hectare. 86 percent farmers have less than Two hectare land holding. Our total operative & cultivated area is 47 percent and the farmers cultivate on that land."

ROLE OF AGRICULTURAL RESEARCH AND EDUCATION

1.11. Agricultural Research and Education has a key role in the development of an environmentally sustainable global food system, ensuring food and nutritional security and increasing farm income by cost minimization and yield maximization. Recognizing these objectives, the National Agricultural Research System of India has produced significant results in terms of mechanization of Agriculture and development of climate resilient technologies and high yielding varieties (HYVs) of seeds, etc.

1.12. During the course of evidence held on 23.8.2022 regarding Farm Mechanization, the Secretary, Department of Agricultural Research and Education submitted:-

"Hon'ble Chairperson was referring to statistics and it is correct if we compare our country with the developed nations then till date only 47 percent farm mechanization has been done. In China it is 59.5 percent, in Brazil it is 75 percent. If we compare our farm mechanization with these two developed nations, it is very less. We have to increase it. There is improvement in this. In the year 1970 power availability was only 0.3 kw per hectare but today it is 2.54 kw per hectare. We have to increase it to 4 kw per hectare by 2030.

If we see crop wise mechanization, we find that today seed bed preparation of rice is 80 percent. Besides in buvai and ropan is 35 percent and in cutting and thrashing it is 60 percent. Overall mechanization with regard to rice is 53 percent. Regarding wheat it is 69 to 70 percent. Likewise, it is about 47 percent in different crops like makka, millet, dalhan, tilhan, kapas, sugarcane etc."

CHAPTER - II

AGRICULTURE MECHANIZATION

Agricultural workers, draught animals, tractors, power tillers, diesel engines, electric motors are used as sources of farm power in Indian agriculture. The combine share of agricultural workers and draught animals in total farm power availability in India got reduced from 60.8% in 1971-72 to 10.1% during 2012-13. On the other hand, the share of tractor and electric motor in farm power availability increased from 6.8 to 45.8% and 14.0 to 26.8%, respectively during the last 41 years. The current trend in sale of tractors indicated the highest share of 49% for 31-37 kw category tractors followed by 33% share for 23-30 kw tractors. The requirement of higher power category tractors in India increased for using higher capacity machines on custom hiring basis.

- 2.2. Agricultural Mechanization plays a key role in improving agricultural production and productivity in developing countries. The cropping intensity in Indian agriculture increased with increase in power availability. It was 120% with power availability of 0.36 kW/ha during 1975-76 and increased to 142% with increase in power availability to 2.24 kW/ha during 2016-17. Net sown area per tractor indicated the reverse trend during the same period, which was 487 ha/tractor in 1975-76 and reduced to 24 ha/tractor in 2016-17. There may be many reasons including rainfall, crop variety, timely use of tractors, electricity availability etc. in increasing the food grain productivity during the period.
- 2.3. The Indian Agricultural Equipment Market has been experiencing a rapid growth with expected strong potential for future growth as well. The demand for agricultural machinery in Asia-Pacific region was more than twice than in any other region. The tractors, power tillers, combine harvesters, rotavators, threshers and rice trans-planters are some of the equipment for which a surge in demand has been witnessed over the past few years.

2.4. The market for power tillers in India is mainly concentrated in the eastern and southern parts of the country owing to the small land holdings per farmer in these regions and high cultivation of rice crop. Overall power tiller density is 2.21 per thousand hectare of net sown area. The self-propelled combines are largely owned by custom-hiring contractors. It has been observed that the sale of machinery like combine, laser guided land leveller and rice transplanter are growing fast on custom hiring mode even though cost is higher, since the demand is more. The market for threshers (multi-crop and paddy), rotavator, planters and zero till drill in India is highly un-organized and is dominated by large number of small and medium scale enterprises (SMEs) located majorly in the states of Punjab, Haryana, Uttar Pradesh, Bihar, Madhya Pradesh, Gujarat, Maharashtra, Tamil Nadu and Andhra Pradesh.

2.5. The Farm Mechanization Levels assessed for major cereals, pulses, oil-seeds, millets and cash crops are given in Table below Farmers need complete mechanization package for major crops.

Mechanization Levels in Major Crops of India

Crop	Seed bed preparation	Sowing/ planting/ transplanting	Weeding, inter-culture & plant protection	Harvesting and threshing	Crop wise average
Rice	80	35	35	60	53
Wheat	85	65	50	75	69
Maize	70	45	40	30	46
Sorghum	60	30	20	20	33
Pulses	65	40	25	35	41
Oilseed	65	40	20	30	39
Cotton	70	40	35	-	36
Sugarcane	65	25	30	20	35
Overall	70	38	31.8	33.7	47.0

Impact of popular farm equipment/machines at Small and Marginal Farmers' Fields

Sl. No.	Name of the Technology/ Machine/ Equipment	No of units sold	Economic benefit (over traditional practices)	
			To individual (Rs/ha)	To country (Crores of Rs/annum)
1.	Manually operated cono weeder	2,25,796	2760	623.81
2.	Tractor operated Bt Cotton Planter	10,500	6500	480.00
3.	Manual wheel hoe	1,44,288	1625	140.68
4.	Pedal/ power operated grain cleaner/ grader	1,250	1100/ t	30.80

5.	Improved direct paddy seeder (8 rows)	50,000	6115	305.71
6.	Animal drawn three row automatic seed-cum fertilizer drill	5,143	2620	24.27
7.	Animal drawn bakkhar	70,000	922	77.42
8.	Tractor drawn peg type puddler	10,280	780	24.05
9.	Power tiller drawn sweep cultivator	5,000	890	5.35
10.	Tractor drawn inclined plate planter	1050	767	2.39
11.	Manual paddy transplanter	225	5150	2.32
12.	Tractor drawn groundnut digger	400	800	1.6
13.	Tractor drawn turmeric harvester	72	4750	0.68
14.	Tractor operated zero-till drill	25	1085	0.04
15.	Self-propelled power weeder	200	1666	0.83
16.	Self-propelled Reaper	100	50	0.06
17.	Multi-crop thresher (engine operated)	1800	25	7.02
18.	Tubular maize sheller	9401	260/ t	1.86
19.	Groundnut decorticator (sitting type)	200	2060/ t	0.09
20.	Pedal operated paddy thresher	1300	600/ t	1.02
Total economic impact = Rs 1730 crores/annum				

BENEFITS OF AGRICULTURE MECHANIZATION

2.6. During the course of evidence sitting held on 23.8.2022 regarding benefits of farm mechanization in the field of Agriculture, the Secretary, Department of Agricultural Research and Education stated as under:-

“Sir, the benefits of mechanization are many, some of which we are enumerating here. First, saving in our seeds and that savings is around 15 to 20 percent. In fertilizers, it is 15 to 20 percent, about 20 to 30 percent of time is also saved, Germination is about 25 percent better, reduction in weeds is 20 to 40 percent, reduction in labour 20 to 30 percent. There is an increase of 5 to 10 percent intensity and 13 to 23 percent increase in crop yield can be achieved through mechanization.”

2.7. When asked by the Committee pertinently as to how the poor farmers will be able to buy the farm equipment with unaffordable cost particularly by small and marginal farmers, the Department, in its written reply stated as under:-

"Government is implementing a Centrally Sponsored Scheme 'Sub-Mission on Agricultural Mechanization' (SMAM) w.e.f. 2014 to provide the incentives to small and marginal farmers and the regions for increasing the reach of farm mechanization where availability of farm power is low. The small and marginal farmers including SC/ST and women beneficiary

are provided subsidy (up to 50% of the equipment cost). The 'Custom Hiring Centres' is also promoted to facilitate small and marginal farmers to avail the benefits of very high cost but efficient farm machines without heavy investment for the individual ownership."

2.8. When asked whether any steps have been taken by the Department with regard to increasing farm mechanization upto a desired level, the Department in its written reply stated :-

"It is expected that another 25 years are required to achieve the level of 75-80% mechanization from the present level of 47%.

In this regard various initiatives have been taken by the Government and in particular, by the Department of Agriculture and Farmers Welfare (DA&FW), Ministry of Agriculture. The Government is helping farmers by providing subsidy to procure machinery to improve farm input and farm power availability.

Ministry of Agriculture and Farmers Welfare has gradually increased the budgetary allocation for implementation of different components of Sub-Mission on Agricultural Mechanisation (SMAM). The Year wise budgetary allocation since 2014-15 to 2022-23 is illustrated in the table given below:

Table: The Year wise budgetary allocation since 2014 -15 to 2022-23

year	Funds Allocated
2014-15	208.30
2015-16	177.85
2016-17	180.00
2017-18	577.58
2018-19	1200.00
2019-20	1033.34
2020-21	1033.09
2021-22	1080.66
2022-23	912.72
Total	5490.82

"

2.9. While replying to an observation of the Committee that due to small and marginal land holdings, the benefits of mechanization are enjoyed by a section of the farmers who have large land holdings, the Department furnished the following

specific steps taken by the Department to promote Small Farm Equipments for the Small and Marginal Farmers as under :-

"Benefit of mechanization is also percolating to small and marginal farmers and the emphasis of the Government is always to promote mechanization for all sections of the society. Accordingly, subsidies have been released to different level of society like SC/ST farmers, hill areas, etc. to promote mechanization in particular section. Small and marginal farmers not covered under subsidy scheme were provided an alternative in the form of custom hiring services.

DoA&FW is implementing a Sub Mission on Agricultural Mechanization (SMAM) under National Mission on Agricultural Extension and Technology (NMAET) w.e.f. 2014-15. The SMAM provides a suitable platform for converging all activities for inclusive growth of agricultural mechanization by providing a 'single window' approach for implementation with a special focus on Small & Marginal farmers. The Steps taken to benefit the small and marginal Farmers under Operational Guidelines of SMAM are as under:

- I. Small & Marginal farmers along with the farmers from SC, ST, Women and NE States get additional subsidy of 10% than the farmers of general category.
- II. During 2014-15 till date, total 37,097 Custom Hiring Centers (19,262 CHCs, 17,432 Farm Machinery Banks & 403 Hi-Tech Hubs) have been established under SMAM. Under the "Promotion of Agricultural Mechanization for In-situ of Crop Residue Management in Punjab, Haryana, Uttar Pradesh and NCT of Delhi" total 38,422 Custom Hiring Centers have been established in Punjab (24,201Nos), Haryana (6775 Nos), Uttar Pradesh (7446Nos) during 2018-19 to till date. These Custom Hiring Centers have enabled farmers to access/ hire Hi-tech and high value machines."

IMPACT OF COTTON GINNING MECHANIZATION

- 2.10. Research and development in ginning and capacity building have brought down the trash content of Indian cotton to less than 5% and improved the quality. About 32% of the ginning factories have adopted the pre-cleaning system developed by Institute (ICAR-CIRCOT, Mumbai). Net benefit to the ginning factories due to bale value improvement and incremental ginning out-turn is estimated to be Rs. 438 crores annually. India export ICAR-CIRCOT developed ginning machine of more than 300 crore annually.

STUDY ON FARM MECHANIZATION

- 2.11. When asked whether any study has been initiated/made to assess the status as Farm Mechanization in India, the Department in its written reply stated as under:-

"No formal study has been conducted to assess the farm mechanization of the country. However, one objective has been mentioned in the impact study conducted by M/S WAPCOS Limited for DA&FW. In the report of M/S WAPCOS Limited submitted in August 2020, farm power availability (state wise, district wise) has been provided. The state-wise mechanization gap has been identified and strategies have been given. However, a nation-wide study is required to make a proper plan of the country based on need and gap. A proposal by ICAR has been submitted to DoA&FW for the purpose."

AVAILABILITY OF FARM POWER:-

- 2.12. There is a linear relationship between availability of farm power and farm yield. Therefore, there is a need to increase the availability of farm power from 2.49 kW per ha (2018-19) to 4.0 kW per ha by the end of 2030 to cope up with increasing demand of food grains. About 85 % of the total land holdings are in small and marginal size groups which need special efforts for its mechanization.
- 2.13. When asked to give details of availability of Farm Power in the State and Union Territories, the Department in its written reply stated :-

"State wise farm power availability (kW/ha) is given in the following table:

S.No.	FARM POWER AVAILABILITY (kW/ha)	
	State	2018-19
1.	Andhra Pradesh.	2.486
2.	Arunachal Pradesh	0.576
3.	Assam	1.2
4.	Bihar	3.499
5.	Chhattisgarh	1.459
6.	Gujarat	3.004
7.	Haryana	5.491
8.	Himachal Pradesh	1.323
9.	Jammu & Kashmir	1.316
10.	Jharkhand	1.336
11.	Karnataka	2.438
12.	Kerala	1.247
13.	Madhya Pradesh	2.005
14.	Maharashtra	1.449
15.	Manipur	0.645
16.	Meghalaya	0.37
17.	Mizoram	0.693
18.	Nagaland	0.61
19.	Orissa	1.975
20.	Punjab	6.011
21.	Rajasthan	1.819
22.	Sikkim	0.691
23.	Tamil Nadu	3.462
24.	Telangana	3.408
25.	Tripura	1.634
26.	Uttar Pradesh	3.485
27.	Uttarakhand	3.054
28.	West Bengal	2.121
	National (Average)	2.488

Government is training the farmers through different mechanisms in different states through KVKs and providing subsidies for encouraging the availability of machinery to reduce disparity of farm powers availability between the states. ICAR is having an umbrella MoU with State Agricultural Universities to implement All India Coordinated Research

Project (AICRP) schemes for location specific research training and demonstrations."

CHAPTER - III

SUB-MISSION ON AGRICULTURAL MECHANIZATION (SMAM)

Recognizing the need to equip the marginal and small farmers with mechanized tools and machines and for inclusive growth of Farm Mechanization Sector in the country, a Sub Mission on Agricultural Mechanization (SMAM) was launched in the year 2014-15 with the following objectives:-

- Increasing the reach of farm mechanization to small and marginal farmers and to the regions where availability of farm power is low;
- Promoting 'Custom Hiring Centers' to offset the adverse economies of scale arising due to small landholding and high cost of individual ownership;
- Creating hubs for hi-tech & high value farm equipments;
- Creating awareness among stakeholders through demonstration and capacity building activities.

MERGER OF SMAM WITH RASHTRIYA KRISHI VIKAS YOJANA (RKVY)

3.2. When asked whether the SMAM was extended after the XII Plan (2012-17), the Department in its written reply submitted as under:-

"As per the minutes of the Expenditure Finance Committee (EFC) issued vide Office Memorandum of Min. of Finance no. 5(12) /PFC-I/2021 dated 6th September 2021 (refer to PARA II, (9) scheme wise recommendation), Sub-mission on Agricultural Mechanization has been merged with the Rashtriya Krishi Vikas Yojana (RKVY) till 30.09.2022. Subsequent EFC/CCGA approval will be processed."

3.3. The financial assistance as cost subsidy to the tune of 40-50% is being provided for the individual ownership of the farm machinery which is also applicable for farm machinery component under Rashtriya Krishi Vikas Yojana (RKVY), National Food Security Mission (NFSM), National Horticulture Mission (NHM) & National Mission on Oilseeds and Oil Palm (NMOOP) schemes for different categories of Machinery & Equipment. The financial assistance @40% is provided for establishment of farm machinery banks to provide the custom

hiring services for the benefits of small and marginal farmers. To promote the mechanization in selected village with low level of farm mechanization, financial assistance @80% of the project cost for farm machinery banks is given to the group of minimum 8 farmers. As a result of different programmes implemented by the Government of India over the years and equal participation from Private Sector, the farm mechanization has been increasing steadily over the years. This is evident from the sale of tractors and power tillers, taken as indicator of the adoption of the mechanized means of farming.

ACHIEVEMENT UNDER SMAM

Table: Achievements made under the Sub Mission on Agricultural Mechanisation (SMAM) since 2014-15 to as on date							
State	Released	Nos. of Demonstration Conducted	Nos. Of Trainees Trained	Nos. of Agricultural Machinery Distributed#	Nos. Of Custom Hiring Centres established	Nos. Of Hi-Tech Hubs established	Farm Machinery Banks established at village level
	(Rs. in crore)	(in numbers)					
Andhra Pradesh	761.27	600	1950	251514	5381	62	3428
Arunachal	46.54	1700	2710	35034	7	0	6
Assam	38.95	0	0	675	8	0	393
Bihar	79.93	0	0	28554	166	2	557
Chhattisgarh	162.92	750	0	86544	1823	0	198
Gujarat	61.06	400	1174	24714	26	6	30
Haryana	208.14	5000	185	22585	1139	13	854
HP	137.24	200	150	39854	14	0	39
J&K	51.64	5630	0	14719	178	0	155
Jharkhand	16.5	0	1250	0	0	0	357
Karnataka	672.95	225	75	171246	122	214	431
Kerala	208.06	504	56	61879	86	0	944
MP	336.12	10500	310	199528	924	22	100
Maharashtra	437.98	1250	0	77974	1087	25	128
Manipur	89.71	4752	0	15711	167	0	487
Meghalaya	7.75	200	0	2270	0	0	3
Mizoram	32.21	0	0	3947	0	0	255
Nagaland	130.8	592	586	12362	23	0	285
Orissa	289.24	200	300	49397	1603	7	128
Punjab	102.68	13800	0	12666	250	6	1000
Rajasthan	96.2	200	1250	23501	650	10	583
Sikkim	29.18	640	233	5454	0	0	65
Tamil Nadu	468.89	0	0	37182	1635	26	1513
Telangana	40.67	1800	900	28954	49	0	146
Tripura	141.07	0	0	39285	0	0	462

UP	403.37	400	1251	139937	3438	0	3640
Uttarakhand	260.6	840	1773	30617	308	0	1506
West Bengal	56.41	4400	1475	6184	380	10	34
Dadar & Nagar Haveli	1.1			89	0	0	
Puducherry	7.51			489	13	0	
Ladhakh	1.03			1314	0	0	
TOTAL	5377.72	54583	15628	1424179	19477	403	17727

3.4. When asked to furnish details whether economic benefits of using improved technologies over traditional practices have been brought to the knowledge of farmers, the Department in its written reply stated :-

"Economic benefits of using improved technologies over traditional practices have been brought to the knowledge of farmers through technology assessment, demonstrations and capacity building of farmers by KVKs. The KVKs conducted 2.52 lakh technology assessment/demonstrations, trained 15.76 lakh farmers on various facets of agriculture and allied sectors, and carried out large number of extension programmes involving 402.21 lakhs farmers for making them aware about new technologies."

3.5. When asked to give details of demonstration made by the Department/ KVKs at the village level regarding the use of Farm Equipments, the Department in its written reply stated as under:-

"KVKs conducted 18,123 demonstrations on improved tools and farm implements including drudgery reduction technologies during 2021-22. Besides, the KVKs also organized 1603 training programmes involving 65251 farmers during the year.

Vocation training programmes in the thematic areas of improved agricultural crop production technology; Operation, Repair and maintenance of farm machinery; Post-Harvest Technology, preservation of fruit and vegetable & small-scale processing and value addition were conducted for duration ranging from one to 25 days. Approximately 256 such programmes have been conducted by the KVK of CIAE, Bhopal for

about 8580 beneficiaries. Adoption and change have been observed as following:

Title of the training	Change in knowledge (Score)		Change in Production (q/ha)		Change in Income (Rs)		Impact %farmers adopted and % change in Income
	Before	After	Before	After	Before	After	
Training on crop production	35	95	30	42	2000	3500	55% farmers adopted 50-75 % change in Income
Training On horticultural Crops	32	75	185	210	45000	67000	62% farmers adopted 20-50% change in Income
Farm Mechanization	12	97	-	-	7800	10500	15% farmers adopted 40-60 % Saving in operation cost
IPM	14	85	-	-	2500	3200	56% farmers adopted 10-15 % change in Income
INM	15	72	-	-	2400	3300	60% farmers adopted 10-15 % change in Income
Custom Hiring	35	95	-	-	7500	15000	30% farmers adopted 80-90 % change in Income
Crop Diversification	15	75	-	-	4500	6500	36% farmers adopted 20-25 % change in Income

TRAINING CENTRES:-

3.6. When asked whether any prototype Training Centres have been set up by the Department for Small Farmers who can use the Farm Equipment in a co-operative model and get benefit in their produce by availing technology, the Department in its written reply stated as under:-

"The Prototype production Centre has been set up at ICAR-CIAE, Bhopal for production of newly developed prototype farm equipment/machines for field demonstration and multi-location trials of the equipment/machines.

Custom Hiring Centres of farm machineries have been established by 121 Krishi Vigyan Kendras (KVKs) at villages for use by farmers especially small and marginal ones. Farmers are able to harvest and

sow/transplant next crops in time during small sowing window and properly manage insects/pests due to these farm machineries.

Design of machinery and equipment are also licensed by ICAR institutes to private companies to manufacture and market in the relevant areas."

SUBSIDY/FINANCIAL ASSISTANCE UNDER SMAM

3.7. When asked whether the subsidy given to the farmers for buying the agriculture machinery is provided under SMAM, Department in its written reply stated as under:-

"The financial assistance @ 40% to 50% of the cost depending on the categories of farmers, is provided under Sub-Mission on Agricultural Mechanization (SMAM) for purchase of agricultural machines. The financial assistance @ 40% of the project cost is also provided to rural youth & farmer as an entrepreneur, Cooperative Societies of Farmers, Registered Farmers Societies, Farmer Producer Organizations (FPOs) and Panchayats for establishment of Custom Hiring Centres (CHCs) and Hi-tech hubs of high value agricultural machines. Higher financial assistance @ 80% of the project cost for the projects costing up to Rs. 10 lakh is provided to the Cooperative Societies, Registered Farmer Societies, FPOs and Panchayats for setting up of village level Farm Machinery Banks (FMBs). For the North Eastern States, the level of financial assistance for establishment of Farm Machinery Banks is @95% of the project cost subject to maximum of Rs. 10 lakhs."

SUBSIDY ON FARM EQUIPMENT TO SMALL AND MARGINAL FARMERS

3.8. Replying to a point pertaining to subsidy given to small and medium farmers for the Purchase of (i) Tractors, (ii) Power Tillers, (iii) Combine Harvesters, (iv) Rotavators, and (v) Rice transplanters, the average cost of these farm machines during 2021-22 in the country and the role of NABARD Banks and States and Union territories, the Department in its written reply stated as under:-

"Government is implementing Sub-Mission on Agricultural Mechanization (SMAM) under which 50% of the cost of the equipment is being provided to the small and marginal farmers for the purchase of Tractors, Power Tillers, Combine Harvesters, Rotavators and Rice transplanter. The maximum permissible limit of subsidy is given in the Table below:-

Type of Agricultural Machinery	Average Cost	Maximum Permissible Subsidy for small and marginal farmers
Tractors		
(i) Tractor 2WD (08-20 PTO HP)	Rs. 4.00 lakh	Rs. 2.00 lakh
(ii) Tractor 4WD (08-20 PTO HP)	Rs. 4.50 lakh	Rs. 2.25 lakh
(iii) Tractor 2WD (above 20- 40 PTO HP)	Rs. 5.00 lakh	Rs. 2.50 lakh
(iv) Tractor 4WD (above 20- 40 PTO HP)	Rs. 6.00 lakh	Rs. 3.00 lakh
(v) Tractor 2WD (above 40 PTO HP)	Rs. 8.50 lakh	Rs. 4.25 lakh
(vi) Tractor 4WD (above 40 PTO HP)	Rs. 10.00 lakh	Rs. 5.00 lakh
Power Tillers		
(i) Power Tiller (8 BHP & above)	Rs. 1.70 lakh	Rs. 0.85 lakh
Combine Harvesters		
(i) Combine Harvester (self-propelled)	Rs.16.00 Lakh	Rs. 8.00 lakh
(ii) Combine Harvester -Tractor powered (without tractor)	Rs.6.00 Lakh	Rs. 3.00 lakh
(iii) Combine Harvester (Track Type)- <6 feet cutter bar width	Rs.14.00 Lakh	Rs. 7.00 lakh
(iv) Combine Harvester (Track Type) - > 6 feet cutter bar width	Rs.22.00 Lakh	Rs. 11.00 lakh
Rice Transplanter		
(i) Self-Propelled Rice Transplanter – walk behind type (4 rows)	Rs.3.00 lakh	Rs. 1.50 lakh
(ii) Self-Propelled Rice Transplanter- above 4 rows and up to 8 rows	Rs.10.00 lakh	Rs. 5.00 lakh
(iii) Self-Propelled Rice Transplanter- above 8 rows	Rs.16.00 lakh	Rs. 8.00 lakh
Rotavators		
a) Rotavator (up to 4 ft.)	Rs.0.84 lakh	Rs. 0.42 lakh
b) Rotavator 5 feet	Rs. 0.84 lakh	Rs. 0.42 lakh
c) Rotavator 6 feet	Rs. 0.896 lakh	Rs. 0.448 lakh
d) Rotavator 7 feet	Rs. 0.952 lakh	Rs. 0.476 lakh
e) Rotavator 8 feet	Rs. 1.008 lakh	Rs. 0.504 lakh

The SMAM scheme is implemented through State and UT Governments. SMAM have Central Sector Schemes component in which Government of India contributes 100%, whereas in case of Centrally Sponsored Schemes

Government of India contributes 60% and states contribute 40% except North Eastern States and Himalayan region States where it is 90% (Central Share) and 10% (State Share)."

SALE OF TRACTORS

3.9. When asked to furnish details regarding the increase in use of tractors and electric motors, the Department in its written reply stated as under:-

The year wise sale of tractor in India and percentage increase/decrease in sale/use of tractors in different states of India is given in the Table below. Use of the tractor has increased which is evident from the increase in the sale of tractors from 2014 to 2021.

Table: Year wise sale of Tractor

Year	Total Sale of Tractors
2014	644770
2015	564586
2016	646669
2017	741320
2018	889672
2019	804000
2020	863125
2021	10,65,280
2022 (till July, 2022)	57862

(Source: Tractor & Mechanization Association (TMA))

Additional subsidy of 10% is provided to small & marginal farmers over and above to general category farmers. The small and marginal farmers are also using tractors on rent basis.

Percentage increase/decrease in sale/use of tractors in different states of India

State	Percentage Sale of tractors, %				Compound Annual Growth Rate (CAGR) 1995-96 to 2015-16
	1995-96 to 1999-2000	2000-01 to 2004-05	2005-06 to 2009-10	2010-11 to 2015-16	
Andhra Pradesh (AP)	5.34	6.33	10.09	7.03	4.99

Assam (AS)	0.20	0.23	0.48	0.69	13.09
Bihar (BR)	4.18	6.66	4.84	5.23	9.45
Gujarat (GJ)	8.35	5.64	7.08	7.36	4.02
Haryana (HR)	8.97	6.12	6.32	4.39	0.86
Himachal Pradesh (HP)	0.18	0.26	0.28	0.23	9.86
Jammu and Kashmir (JK)	0.22	0.57	0.38	0.46	9.19
Karnataka (KA)	2.96	4.71	5.94	5.17	6.54
Kerala (KL)	0.32	0.14	0.22	0.08	-5.22
Maharashtra (MH)	11.91	12.70	7.06	10.03	3.59
Madhya Pradesh (MP)	6.75	4.21	7.71	7.97	6.10
Odisha (OD)	0.70	3.95	1.84	2.07	10.28
Punjab (PB)	11.82	7.52	5.48	4.34	-1.60
Rajasthan (RJ)	9.64	7.82	8.63	9.30	6.33
Tamil Nadu (TN)	4.24	3.68	5.05	2.66	1.22
Uttar Pradesh (UP)	21.26	22.23	14.92	13.66	3.75
West Bengal (WB)	1.03	1.23	1.76	2.10	11.01
Export & other states	1.93	6.02	11.93	17.22	18.17
Total India	100.00	100.00	100.00	100	

(Source: Senthilkumar, T., and NS Chandel CR Mehta. "Trends of Tractorization in Indian Agriculture." (2017)

PROMOTION OF USE OF TRACTOR

3.10. On being asked about the strategy to promote the use of low horse power tractors, the Department in its written reply Stated as under:-

"Following ways can be adopted to promote low horse power tractors which are mostly used by small and marginal farmers and orchard growers.

1. Tractor parts and components attract GST @ 12%. This means small tractor costing about 5-8 lakh leads the farmer to pay 60-96 thousand as GST. GST can be reduced to nil or 5% leading to a saving of Rs. 35-56 thousand (@5%).
2. The implementation of Emission norm (Term-IV and V) for tractors (More than 50 hp) sold in India will increase the cost of tractors by 20-25%. It will put an additional burden on small and marginal farmers. The implementation of emission norm may be put on hold.
3. High horse power tractors are being bought by medium and large farmers and custom hiring entrepreneurs. A large chunk of subsidy is offered to such owners. Such subsidy should be stopped and counter

vailing subsidy should be offered to farmers buying tractors up to 35 hp only.

4. Tractors are being used by sector(s) other than agriculture like construction, aviation, transport, etc. Tractors being used in other sectors may attract higher GST (12 or 18%) to compensate the GST benefits provided to small tractors."

- 3.11. On being asked about the role played by Department of Agricultural Research and Education with regard to SMAM implemented by the Department of Agriculture and Farmers Welfare, the Department in its written reply stated as under:-

"The DARE and ICAR share their technical expertise and new machine/ technologies with SMAM to increase the efficacy of the Sub-Mission. The ICAR-DA&FW interface meeting is held twice in a year *i.e.* before Kharif and Rabi seasons. In these meeting, technologies/ new machines developed by ICAR is shared with the Department to include in the subsidy programme and demonstration programmes. In addition, need based inter-departmental committees are also formed and work together for particular issues. At state level, ICAR Regional Committee for each region provide an interface with the States. The KVKs in each district has institutional linkage and interface through Agricultural Technology Management Agency (ATMA) with district agriculture development department."

- 3.12. When asked how the SMAM has benefitted /impacted Small and Marginal Farmers in the country in each State and Union Territory, the Department in its written reply stated as under:-

"Since implementation of SMAM 2014-15, total Rs 5377.7 crores has been released under SMAM against which 14,24,179 machines were distributed, 54,583 Demonstrations have been organized, and established 19,477 CHCs, 403 Hi-Tech Hubs and 17,727 Farm Machinery Banks. As a result the National average Farm Power

availability has been increased from 1.72 kW/ha in 2012-13 to 2.49 kW/ha (2018-19) and tentatively it is reaching to 2.54 kW/ha in 2021-22.

Impact study of SMAM indicates that due to mechanizations there is saving in seed (15-20%), fertilizer (15-20%), time (20-30%) and reduction in weed (20-40 %), labour (20 – 30 %), and better germination (7 – 25 %), cropping intensity (5-20 %), more crop yield (13-23 %).

- 3.13. When asked how the farm Technology will reach each State and Union Territory, District, each block, each village where no technology exists, the Department in its written reply stated as under:-

"The technologies can reach to unreached through field demonstrations of the required & advance technologies and machinery at village level. During 2014-15 to 2021-22, total 54583 demonstrations have been organized by the State Agricultural Departments. Apart from this 2726 demonstrations were organized through 4 Regional Farm Machinery Training and Testing Institutes of DA&FW at Budni (M.P), Hisar (Haryana), Anantapur (Andhra Pradesh) and Biswanath Chariali (Assam). The Krishi Vigyan Kendras (KVKs) present in each district also assists in extension related activities for spread of the technologies through frontline demonstrations, trainings etc. Establishment of custom hiring Centres also make available the machines those farms who cannot afford to purchase the costlier farm implements/ machine."

FARM MACHINERY BANKS

- 3.14. On being asked to give details of financial assistance given to Farm Machinery Banks till the end of 2021, District-wise in each State and Union territory, the Department in its written reply stated as under:-

"State-wise and year-wise financial assistance given for establishing farm machinery bank by DA&FW is presented in below table.

<p>Table: State wise & Year-wise detail of financial assistance provided for establishment of Farm Machinery bank for Custom Hiring services including small and marginal farmers under SMAM (Rupees in Crore)</p>

State	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Andhra Pradesh	0.00	0.96	4.80	35.40	18.00	36.43	120.19	77.90
Arunachal	0.00	0.00	0.00	0.22	0.04	0.00	0.29	0.00
Assam	3.28	0.00	0.86	3.60	0.00	0.00	0.00	18.22
Bihar	2.52	0.00	11.95	0.00	0.00	0.00	15.74	0.00
Chhattisgarh	0.50	0.00	2.47	3.29	18.65	6.36	12.36	9.53
Gujarat	0.40	0.24	0.00	0.00	0.00	0.00	1.15	0.19
Haryana	0.88	0.00	0.00	0.00	21.00	10.80	22.08	13.39
HP	0.06	0.02	0.05	0.07	0.12	1.20	0.67	0.00
J&K	0.00	0.00	0.00	0.10	0.46	7.70	1.30	2.16
Jharkhand	2.12	2.16	2.40	1.63	4.80	0.00	0.00	3.60
Karnataka	0.04	0.00	0.00	0.00	0.00	1.80	11.33	10.44
Kerala	0.86	0.00	0.26	2.93	5.50	0.79	9.94	19.66
MP	0.36	0.24	0.00	2.40	3.41	2.40	12.96	0.34
Maharashtra	1.34	0.91	1.37	1.51	2.33	2.28	11.71	10.51
Manipur	0.26	0.00	0.00	0.36	20.34	6.26	6.05	7.60
Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00
Mizoram	0.16	0.72	0.72	2.16	1.94	6.12	4.61	1.80
Nagaland	0.38	0.25	0.68	1.80	3.02	2.88	8.42	3.60
Orissa	0.62	0.00	17.28	15.41	10.80	0.24	0.00	7.92
Punjab	0.66	0.00	43.08	10.13	0.00	0.00	0.00	0.00
Rajasthan	1.30	0.00	0.00	5.90	0.00	0.00	11.50	12.62
Sikkim	0.04	0.00	0.43	0.22	0.00	0.72	0.48	0.72
Tamil Nadu	1.70	2.38	6.00	17.76	40.32	15.96	17.42	7.46
Telangana	0.18	0.00	0.24	0.72	0.00	0.00	7.01	0.00
Tripura	0.16	0.29	0.00	5.98	7.20	7.20	5.83	4.68
UP	11.70	7.20	32.09	15.41	13.61	19.44	67.30	62.98
Uttarakhand	0.26	0.50	1.01	16.78	1.44	23.50	15.94	13.78
West Bengal	0.92	1.44	0.29	3.00	3.16	1.39	1.13	0.60
TOTAL	30.70	17.32	125.99	146.76	176.13	153.48	365.62	289.69

3.15. On being asked to give reasons for substantial increase in financial assistance of Rs. 365.52 Crore during 2020-21 for establishing farm machinery bank as compared to Rs. 153.48 Crore during 2019-20 and again decrease to Rs. 289.69 Crore in the year 2021-22, the Department in its written reply stated as under:-

"Sub-Mission on Agricultural Mechanization (SMAM) is a Centrally Sponsored Scheme implemented through the State Governments with sharing of funds between the Centre and States. The Central funds are released to the States based on the Annual Action Plans (AAPs) submitted by the States prioritizing the different activities to be undertaken by them, which attributes to the variation in allocation of funds for a particular activity."

3.16. When asked how many farm machinery banks have been set up State and Union Territory wise, the Department in its written reply stated as under:-

"During 2014-15 to till date, total 17,727 Farm Machinery Banks and 403 Hi-Tech Hubs have been established under SMAM Scheme of DA&FW. The details are given below:

State	Farm Machinery Banks Established at VillageLevel	Nos. Of Hi-Tech Hubs Established
Andhra Pradesh	3428	62
Arunachal	6	0
Assam	393	0
Bihar	557	2
Chhattisgarh	198	0
Gujarat	30	6
Haryana	854	13
HP	39	0
J&K	155	0
Jharkhand	357	0
Karnataka	431	214
Kerala	944	0
MP	100	22
Maharashtra	128	25
Manipur	487	0
Meghalaya	3	0
Mizoram	255	0
Nagaland	285	0
Orissa	128	7
Punjab	1000	6
Rajasthan	583	10
Sikkim	65	0
Tamil Nadu	1513	26
Telengana	146	0
Tripura	462	0
UP	3640	0
Uttarakhand	1506	0
West Bengal	34	10
Dadar & Nagar Haveli	-	0
Puducherry	-	0
Ladhakh	-	0
TOTAL	17727	403

3.17. On being asked to give details on Hubs created for hi-tech and high value Farm Equipments in the country so far, the Department in its written reply stated as under:-

"The number of Hi-Tech Hubs established under SMAM is presented in table given below:

Table: SMAM since 2014-15 to as on date	
State	Nos. of Hi-Tech Hubs Established
Andhra Pradesh	62

Bihar	2
Gujarat	6
Haryana	13
Karnataka	214
MP	22
Maharashtra	25
Orissa	7
Punjab	6
Rajasthan	10
Tamil Nadu	26
West Bengal	10
TOTAL	403

CUSTOM HIRING CENTRES

3.18. When asked to give details of number of Small and Marginal Farmers actually benefitted by the use of Custom Hiring Centres and also the reason for not establishing the custom hiring centres in all the States and Union Territories of the Country, the Department in its written reply states as under:-

"The Custom Hiring Centres/Hi-tech Hubs/Farm Machinery Banks have been established in almost all the States except the Union Territories of Ladakh and Dadra & Nagar Haveli. The States like Andhra Pradesh, Tamil Nadu, Haryana, Chhattisgarh Madhya Pradesh and Uttar Pradesh are the front runners in establishing these Centres. The impact evaluation of study of Sub-Mission on Agricultural Mechanization conducted by WAPCOS Limited in 2018-19 indicated that a well-equipped Custom Hiring Centre provide farm mechanization support to neighbouring 100-200 farmers covering about 200 ha in a cropping season. These CHCs/Hi-tech Hubs/FMBs have been observed to benefit the client farmers by way of 10-20% saving in inputs, 25-30% reduction in the cost of production, 15-25% increase in production, and 25-40% increase in gross income of farmers."

3.19. When asked whether any plan has been envisaged by the Department with keeping in view the continued shrinkage in average farm size consequently it falling into adverse category and making individual ownership of agricultural machinery progressively uneconomical, the Department in its written reply stated as under:-

"One of the major objectives of SMAM is to promote custom hiring of farm machinery (pay and use the mechanization solution) and farm machinery banks (maintain a set of required equipment and use on sharing basis), so that small and marginal farmers can get the benefits of farm mechanization. The custom hiring centres have been established under SMAM and it has proved to be a successful model in some states.

Tractor and self-propelled high capacity farm implements and machinery are being promoted on custom hiring basis for use by small farm holders for timeliness of farm operations without owning the high value farm equipment/machines.

Establishment of Custom Hiring Centers/Farm Machinery Banks and Hi-Tech Hubs under the "Sub- Mission on Agricultural Mechanization (SMAM)" and "Promotion of Agricultural Mechanization for In-situ of Crop Residue Management in Punjab, Haryana, Uttar Pradesh and NCT of Delhi", Schemes of DA&FW, have enabled farmers to access/to hire high value machines, which cannot be purchased by the individual Farmer. ICAR institutes also take R&D projects for development of machinery/equipment keeping small and marginal farmers in considerations."

FARM MACHINERY STANDARDIZATION

3.20. When asked about the steps taken by the Department to address the issue of Farm Machinery Standardization, which has been stated to be a multi-Ministerial and complex issue, the Department in its written reply stated as under:-

"Farm Machinery standardization as stated is a complex issue because it involves Ministry of Agriculture, Ministry of Animal Husbandry and Fisheries, Bureau of Indian Standards, Ministry of Commerce, Ministry of Road Transport, etc. Apart from that other stakeholders such as

manufacturers, research institution and International bodies are also involved in standardization process.

The following steps have been taken for farm Machinery Standardization:

- I. Department is closely involved with BIS to review or revise the Indian standards. The Committee for formulation of standards related to agricultural machinery (FAD-11) has been constituted and headed by Director, ICAR-CIAE, Bhopal with members from ICAR, SAUs, National Level Farm Machinery Testing Centres, Agricultural Machinery Manufacturers Association (AIMA), Tractor Machinery Association (TMA), progressive farmers and personnel from relevant departments of other ministries. The Committees review the new standard to be developed or old standard to be revised, modified or reaffirmed.
- II. The Four Farm Machinery Training & Testing Institutes at Budni (MP), Hisar (Haryana), Anantapur (Andhra Pradesh) and Biswanath Chariali (Assam) have been established for testing and performance evaluation of farm machinery and equipments.
- III. 37 different institutions under State Governments, State Agricultural Universities, Indian Council of agricultural Research (ICAR) have been authorized for testing and performance evaluation of machines and equipment."

3.21. On the steps taken by the Department with regard to Farm Machinery standardization, the Department in its written reply stated as under:-

"It is a multi-ministerial complex issue. Government has to make a policy and implement. In order to enforce compatibility/matching i.e. interchange ability in the manufacture of agricultural implements, manufacturing of critical components need to be standardized and encouraged for mass production by medium and large-scale manufacturers. This will also help in setting up of ancillary units, which can specialize in the manufacture of

these standard components thus increasing the product spectrum and enhance employment opportunity.

The followings are suggested:

- I. Standardization of design of equipment/attachment/parts at BIS level and implementation of standards at the manufacturers level.
- II. Testing of equipment/attachment/parts manufactured by different manufacturers for ensuring their adherence to the BIS standards specifications.
- III. Promotion of use of standard parts available in the market, in equipment being manufactured by different manufacturers. The availability of standard parts makes production simpler and improves components/attachments interchange ability.
- IV. Training of manufacturers in manufacturing technology on use of jigs-fixtures, die-punches, templates and other tooling aids for improving quality and compatibility/matching."

DELIVERY WINDOW FOR FARM EQUIPMENTS:-

3.22. When asked whether the delivery point of Farm Equipment is at all the three levels; the Department in its written reply stated as under:-

"Delivery point for transferring the benefits is available through National (Do&FW), State (State Department of Agriculture) and District (ATMA/District Agriculture Office) and KVKs. At Sub-division level there are SDAEOs and at block level there are ADOs Agriculture etc. The SMAM is being implemented through this delivery mechanism only, but Agricultural engineers who can deliver in better ways is weak in most of the states (except Tamil Nadu)

The department is pursuing it to strengthen the link through the ministry."

CHAPTER - IV

RESEARCH AND DEVELOPMENT FOR SMALL AND MARGINAL FARM MECHANIZATION

During last five years (2017-22), Institutes along with Centres of the All India Coordinated Research Projects (AICRPs) have carried out a variety of activities in the field of mechanization of production and post production agriculture in the effort for improving farmer's income. Some developments are enumerated as hereunder:

- Developed around 158 improved technologies/machines related to farm mechanization, agro-processing, renewable energy, irrigation and drainage etc.
- Commercialized 47 Technologies through licensing to machinery manufacturers for their mass production, so that those could be made available to farmers
- Total 1748 farmers were given hands-on Training on Improved Agricultural Implements and Machinery. These farmers are from different states of India.
- Organized two annual Kisan Melas in which about 4000 farmers and other stakeholders participated.
- Participated and displayed technologies to over 10 lakh farmers, manufacturers, visitors through participation in 25 Agri-exhibitions & Fairs - International – 5, National – 10, Regional Agri-fairs–10. In addition, about 5000 stakeholders including farmers, manufacturers, scientist, faculty, policy makers had half to one day exposure visits to Institutes.
- Manufactured more than 18500 research prototypes and supplied to other centres for multi-location trials or as per demand.
- Test certificate of more than 400 commercial machines were issued.
- Conducted prototype feasibility testing of 76 improved farm equipment for their adoption at 25 AICRPs centres
- Conducted Frontline Demonstrations of more than 105 improved farm equipment and machinery in more than 10000 ha area.
- Technology and Machinery Demonstration Meets were organised during last four years in February by centres of AICRP on Farm Implement and Machinery on a large scale and more than 3.00 lakh farmers participated at different centres to witness display and demonstration of improved farm machinery.
- Established 07 Rural technology Centers in villages under AICRP on Utilization of Animal Energy for promotion of animal drawn improved equipment.

- Total 7369 farmers trained by 188 trainings on use of improved animal drawn implements.
- Total 6575 farmers benefitted by 219 demonstration programmes on use of improved animal drawn implements.
- Organized 16 Entrepreneurship Development Programmes on Custom Hiring of Agricultural Machinery, benefitting about 450 rural youth.

FIELD DEMONSTRATIONS

Major equipment/machine taken up for front line demonstration (FLD) in small and marginal farmers' fields

Equipment/Machine name	Area covered (ha)	No. of Locations
Happy seeder	2770.0	1206
Combine with super straw management (SMS)	1313.7	480
Paddy straw chopper/mulcher	2037.2	599
Laser leveller	211.8	52
Roto till drill	104.5	27
Direct Seeded rice drill	952.0	325
No till drill/zero till drill	910.5	348
Reversible M.B. Plough	1289.2	368
Tractor drawn high clearance sprayer	588.2	182
Self propelled riding type paddy transplanter	297.4	49
Modified wheat straw combine	33.5	7
Ridge furrow opener	19.8	10
Super seeder	34.0	30
Shrub master/ rotary slasher	147.0	128
Multi row rotary weeder	18.0	21
Animal drawn high clearance sprayer	184.7	158
Animal drawn CRIDA Planter	258.7	280
Bullock drawn manure spreader	35.0	41
Tractor operated potato planter	4.5	4
Tractor operated garlic planter	9.0	8
Semiautomatic potato planter	4.0	3
Inclined plate planter	8.5	7
Pedal/ Power operated cleaner grader	25.0	24
Groundnut decorticator	12.0	15
Ridge furrow machine	19.8	14

4.2. On being asked by the Committee as to whether the benefits of Research & Development for Small and Marginal Farm Mechanization done by the Department has percolated to village level in the country, the Department in its written reply stated :-

"Yes, benefit of R&D for small and marginal farmers are percolating to villages and thus level of mechanization of the country is

increasing. Agriculture, however is a state subject, the promotion of newly developed technology depends upon the state policy also. ICAR has been constantly trying to popularize and promote its developed technologies and machines through the developmental programmes including SMAM.

The awareness is created among farmers about improved farm equipment and farm mechanization regularly through ICAR Institute, 25 AICRP Centres of Farm Implement and machinery, 9 AICRP Centre of Utilization of Animal Energy by field demonstrations, kisan melas and exhibitions across the country. The Krishi Vigya Kendras (731 centres) also create awareness about farm mechanization among farmers in their respective districts."

- 4.3. On being further asked whether proper guidance is being imparted to the farmers in use of machine equipments to reduce fuel wastage and high cost of production, the Department in its written reply stated as under:-

"To reduce fuel wastage and high cost of production, farmers and custom hiring centres select appropriate and matching equipment for tractors, power tillers and other prime movers as per agro-climatic conditions. A software has been prepared for agro-climatic zone wise suitable farm machinery and hosted on the ICAR-CIAE, Bhopal.

- 4.4. On being asked about the initiatives taken by the Department regarding establishment of a Directorate of Agricultural Engineering in each State, the Department in its written reply stated :-

"At present, Directorate of Agricultural Engineering exists only in two States (Madhya Pradesh and Tamil Nadu). Recently Hon'ble Union Minister for Animal Husbandry, Fisheries and Dairying has sent a DO letter (vide letter no. Ag. Engg. 2/11/2018-AE, dated 28.06.2022) to all Chief Ministers of states to establish a Directorate of Agricultural Engineering in their states."

4.5. When asked by when the Soil Plant Analysis Development (SPAD) Meter for Nitrogen status and spectral reflectance based variable application system will be available for the use of farmers, the Department in its written reply stated as under:-

"The SPAD meter for nitrogen status developed by ICAR-CIAE, Bhopal has been licensed to three manufacturers and soon it will be available in the market for purchase and use by different stakeholders."

4.6. On being asked to furnish details of the SPAD and spectral reflectance based variable application system to be used by small and marginal farmers, the Department in its written reply stated as under:-

"The SPAD meter or spectral reflectance based advisory service has to be provided by agro-service providers/KVKs or block level agencies. These service providers will provide services to individual small and marginal farmers."

4.7. Pointing to the fact that as the farm machinery are very costly and small farmers find it difficult to purchase the equipment and even if they buy the equipment, they will not be in a position to use the equipment throughout the year. When asked whether the Department has looked into this issue and found any solution, the Department in its written reply stated as under:-

"Considering the difficulty of owning and maintaining the farm machinery on individual ownership, custom hiring of equipment on pay basis is promoted. For economically backward sections where it will be difficult for individual farmers to pay for custom services, the model of farm machinery bank has been put in place. In this model, a group of farmers can own and share the machines among themselves at mutually agreed charges to maintain the bank."

4.8. When asked whether any research has been carried out by the Department in the use of latest technologies like drone robotics for the use and analysis of farm produce, the Department in its written reply stated as under:-

"At present as per GOI initiative, drones are being promoted for spraying operation. The Council has taken up a few research projects to increase the utilization of drones in agriculture in the areas of crop health monitoring, yield estimation of field/horticultural crops, fertilizer applications, seeding etc."

- 4.9. During the course of evidence with regard to important machines for small and marginal farmers, the Secretary DARE submitted before the Committee as under:-

"Sir, tractor operated inclined plate planter we have sold more than 11000 units, Power weeder we have sold more than 4000 units and Tractor drawn Peg type paddler we have sold more than 10,000 units. In this per hectare Rs.2200 is saved and 10 to 12 percent area is increased. Tractor paddy straw chooper-cum-spreader which can be used for preventing parali which is burned in Punjab, Haryana and Uttar Pradesh we have sold more than 21 units the price of this machine is 90,000. We are finding the benefits of this machine in the last three years and the next machine is Tractor operated Seed Spice planter"

- 4.10. When asked whether any initiative has been taken by the Department for opening of National Institute of Agricultural Robotics and Artificial Intelligence; the Department in its written reply stated as under:-

"Our lands are highly fragmented and will get further smaller and smaller in time to come. Tiny robots and AI for Indian farm operations in future are urgently needed. A centre for 'Agri-electronics and Automation in Agriculture' has been created at ICAR-CIAE, Bhopal and a division of sensor and automation engineering has been established at ICAR-CIPHET Ludhiana. A new ARS discipline of "electronics and instrumentations" for selection of scientists through All India Examinations has also been started. The National Institute of Agricultural

Robotics and AI has been proposed under Vision India-2047 initiative of Hon'ble Prime Minister of India. "

- 4.11. When asked how the farm mechanization will help in the deserts, difficult areas, hilly regions, tribal areas, inaccessible areas in the country, the Department in its written reply submitted as under:-

"Institutes of ICAR, centres of AICRPs have developed tools and equipment, which reduces the drudgery of farm operations and labour requirement in hilly and tribal areas. At present manually operated and animal operated tools are being promoted in such areas. Some engine operated machines have also been developed to perform farm operations in stationary mode. Engine operated manually guided farm machines are also being developed to further reduce the drudgery of operation and increase the work output.

BUDGETARY ALLOCATION FOR RESEARCH AND DEVELOPMENT

- 4.12. When asked whether sufficient funds have been allocated to the Department for doing Research and Development; the Department in its written reply submitted:-

"The proportion of Budgetary Allocation (Revised Estimates) made in favour of the Department out of the Total Budget (RE) of the Government of India has been reduced from 0.32% in 2018-19 to 0.29 % in 2019-20 and further to 0.22% in 2020-21.

The BE and RE proposed by the Department and allocation made by Ministry of Finance are as under:

(Rs in Crore)

Year	BE Proposed	BE allocated	RE Proposed	RE allocated
2020-21	10650.17	8362.52	8397.71	7762.38
2021-22	10241.68	8513.62	9330.53	8513.62
2022-23	9698.91	8513.62		

This has resulted into proportionate reduction in inter-sectoral allocation within the Department.

The Budget provided for R&D to Farm Mechanization Scheme (ICAR-CIAE, Bhopal + 4 AICRPs+ 2 CRPs) during last four years is given below. It shows that around 30% less fund allocation during this year as compared to 2019-20. It also indicates that there is continuous reduction in funds allocated to the scheme during last few years.

Year	Budget (in Rs. Lakh)
2019-20	2177.10
2020-21	1828.12
2021-22	1797.14
2022-23 (BE)	1586.64

The Secretary, Department of Agricultural Research and Education has written DO letters dated 21.01.2022 and 11.11.2021 for additional allocation of funds to the Departments. The issue was also discussed during the pre-budget meeting held for discussion of expenditure ceilings with Secretary Expenditure. The Department is continuously requesting the Ministry of Finance for enhanced budgetary allocation through various means available in Govt. set up. "

BUDGETARY ALLOCATION FOR FARM TRAINING AND TESTING INSTITUTES

4.13. When asked to give details of Budgetary Allocation and Expenditure regarding work done by the Department in creating awareness among stake holders through demonstrations and capacity building activity in each year from the 2014-15 till date, the Department in its written reply stated :-

"MoA&FW is providing the training and organizing demonstrations in the area of Farm Machinery through its four dedicated Farm Machinery Training and Testing Institutes as under:

- i. Central Machinery Training and Testing Institute, Tractor Nagar Budni 466 445 (M.P.)
- ii. Northern Region Farm Machinery Training & Testing Institute Sirsa Road Hissar, (Haryana) – 125001
- iii. Southern Region Farm Machinery Training & Testing Institute Tractor Nagar, P.O. Garladinne- 515731 District Anantapur A.P.

iv. North Eastern Region Farm Machinery Training & Testing Institute P.O. Biswanath Chariali -784176, Distt. Sonitpur, (Assam)

Budgetary allocation in respect of is all the Administrative, Training & demonstrations and Testing activities at all 4 FMTTIs of DA&FW.

Years	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Budget Provided (Rs in crores)	32.87	44.29	43.62	52.58	59.71	53.34	56.98	54.55	52.01

In addition to above ICAR Institutes and KVKs also conducts several awareness programme for farm machinery and equipment. However, there is no separate budget for this activity under ICAR."

CHAPTER - V

CHALLENGES IN MECHANIZATION

Land size, cropping pattern, market price of crops including Minimum Support Price (MSP), availability of labour and cost of labour are the major factors deciding the agricultural mechanization. These challenges pose a serious impediment to the growth of the industry and agriculture. The key challenges faced by the farm mechanization in India are as follows.

- i. The average farm size in India is small (1.08 ha) and small and marginal land holdings (less than 2.0 ha) account for 86% of land holdings as compared to the European Union (14 ha) and the United States (170 ha). Therefore, there will be little mechanization unless machines appropriate for small holdings are made available or substantial farm amalgamation takes place. Due to small size of land holdings, it is difficult for the farmers to own machinery. As a result, the benefits of mechanization are enjoyed by only a section of the farmers who have large farm holdings.
- ii. Mechanizing small and non-contiguous group of small farms is against 'economies of scale' especially in operations like land preparation and harvesting. With continued shrinkage in average farm size, more farms will fall into the adverse category thereby making individual ownership of agricultural machinery progressively more uneconomical.
- iii. The high cost and energy efficient farm machinery are capital intensive and majority of Indian farmers are not able to acquire these assets due to shortage of capital with them. Therefore, an arrangement to provide custom hiring service facility for these farm machinery to the farmers by engaging unemployed rural youth will go a long way in meeting the requirements.
- iv. Matching equipment for tractors, power tillers and other prime movers are either not available or farmers make inappropriate selection in the

absence of proper guidance, resulting in fuel wastage and high cost of production.

- v. The quality and after sales service of farm machinery are the other concerns in India as the majority of farmers are cost conscious. There are inadequate service centers for proper up-keep of the machinery. In addition, the inability of local low cost manufacturers to come up to the levels of standard designs of equipment also poses a big challenge to farm mechanization.

I. Progress made under challenges in farm Mechanization

S. no.	Point under challenges	Progress made
i.	The average farm size in India is small (1.08 ha) and small and marginal land holdings (less than 2.0 ha) account for 86% of land holdings as compared to the European Union (14 ha) and the United States (170 ha). Therefore, there will be little mechanization unless machines appropriate for small holdings are made available or substantial farm amalgamation takes place. Due to small size of land holdings, it is difficult for the farmers to own machinery.	<ul style="list-style-type: none"> • Developed suitable manual/animal drawn/power operated equipments/machines for small and marginal farmers. • Demonstration of the improved farm equipment to the farmers are regularly being conducted. • Hands on training on improved agricultural equipment/machine to farmers/rural youth/rural artisans are being imparted. • Improved equipment to farmers/other stakeholders in exhibition and farmers' fairs are being displayed regularly. • Financial assistance for procurement of the improved equipment/machines to small and marginal farmers'/farmer societies/custom hiring centres under ongoing scheme under sub-mission of Agricultural Mechanization (SMAM) is being provided.
ii.	Mechanizing small and non-contiguous group of small farms is against 'economies of scale' especially in operations like land preparation and harvesting. With continued shrinkage in average farm size, more farms will fall into	A number of manual, animal drawn farm tools/implements/machinery have been developed those can be adopted on small and fragmented land-holding. These tools and implements are being demonstrated to the farmers by Institute and AICRP

	the adverse category thereby making individual ownership of agricultural machinery progressively more uneconomical.	Centres. The improved equipments are also promoted by state governments.
iii	The high cost and energy efficient farm machinery are capital intensive and majority of Indian farmers are not able to acquire these assets due to shortage of capital with them. Therefore, an arrangement to provide custom hiring service facility for these farm machinery to the farmers by engaging unemployed rural youth will go a long way in meeting the requirements.	Rural youth and farmers are encouraged and trained to establish the custom hiring centres. The services of the Custom Hiring centres are useful to the small and marginal farmers for timeliness of farm operations and reduce the cost of cultivation without owning the machines.
iv.	Matching equipment for tractors, power tillers and other prime movers are either not available or farmers make inappropriate selection in the absence of proper guidance, resulting in fuel wastage and high cost of production.	To reduce fuel wastage and high cost of production, farmers and custom hiring centres may select appropriate and matching equipment for tractors, power tillers and other prime movers as per there agro-climatic condition. Software has been prepared for agroclimatic zone wise suitable farm machinery and hosted on the ICAR-CIAE, Bhopal website, which can be accessed through following link: <i>http://14.139.59.149:84/Home/MachineryPackage</i> It is also available (at Google Play Store) as an App (<i>KrishiYantraMitra</i>)
v.	The quality and after sales service of farm machinery are the other concerns in India as the majority of farmers are cost conscious. There are inadequate service centers for proper up-keep of the	<ul style="list-style-type: none"> • To improve the quality of the manufacturing and reduce breakdowns, testing centres are testing the commercial machines/equipment for ensuring their adherence to the BIS standards specifications.

	<p>machinery. In addition, the inability of local low cost manufacturers to come up to the levels of standard designs of equipment also poses a big challenge to farm mechanization.</p>	<ul style="list-style-type: none"> • Institute-manufacture interaction meets at regular intervals ensure that manufacture get information on new development and take licence of improved equipment for manufacturing, training on services and supports after sales. • Promotion of use of standard parts available in the market, in equipment being manufactured by different manufacturers. The availability of standard parts makes production simpler and reduce chances of break down. • Training of manufacturers in manufacturing technology on use of jigs-fixtures, die-punches, templates and other tooling aids for improving quality and compatibility/matching.
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II. Progress made so far on different points under “Future needs”

S. no.	Point under Future Needs	Progress made
i	<p>There is a need to conduct systematic study for knowing the mechanization level in the country.</p>	<p>We are presently estimating it with machine, labour and power sources available. For actual study through survey proposal has been submitted to DA&FW.</p>
ii	<p>Delivery points at block and district level in case of agricultural machinery is almost missing. There is no engineering manpower to demonstrate, train, help in repair/maintenance and guide farmers at their doorstep. There is urgent need of agricultural engineers at block and district level in each state.</p>	<p>The ICAR is pursuing case through the ministry and DO letters were written to all state Governments by Hon’ble Union Cabinet Minister of Fisheries, Animal Husbandry, and Dairying Shri Parshottam Rupala ji (then MoS, Agriculture & Farmer Welfare) (vide D. O. letter no. Ag. Engg. 2/11/2018-AE, dated 03.08.2018 and dated 12.11.2018). Again letter (vide D. O. letter no. Ag. Engg. 2/11/2018-AE, dated 28.06.2022) was written by Hon’ble Union Cabinet Minister of Fisheries, Animal Husbandry, and Dairying Shri Parshottam Rupala ji to the States</p>

		<p>and UTs for Creation of district/block wise “Agricultural Engineering Officer” post for accelerating agricultural mechanization in the state.</p> <p>In meeting a chaired by DDG Agricultural Engineering and Additional Secretary AF&W AFW as a subgroup to address the agenda of Group of Secretary meeting, this issue has also been accepted as action of DA&FW.</p> <p>The Secretary DARE and DDG Agricultural Engineering ICAR are also pursuing the issue through different forum and writing letters to different state governments.</p>
iii	<p>To monitor and implement the government policy and programme of mechanization more efficiently a Directorate of Agricultural Engineering is needed in each state. Instead of sub-scheme on submission of agricultural mechanization, Govt. should have full-fledged mechanization scheme to accelerate the achievements.</p>	<p>As above in point no (ii) for first part. We have suggested to DA&FW in meetings and discussion. Action is awaited.</p>
iv	<p>Consolidation of the widely fragmented and scattered land holdings.</p>	<p>A number of manual and animal drawn farm tools/implements/machinery have been developed those can be adopted on small and fragmented land-holding. These tools and implements need to be promoted by state governments through different schemes.</p> <p>Tractor and self-propelled high capacity farm implements and machinery may be promoted on custom hiring basis for use by small farm holders for timeliness of farm operations and to reduce the cost of cultivation.</p> <p>If further fragmentation continues, small/tiny robots will be required to</p>

		<p>do the farm operations in future and thus a concerted efforts/programmes may be helpful in future.</p> <p>However, it may be better if a policy decision for land consolidation is taken by the concern department of the Govt. and implemented in whole country to stop further fragmentation.</p>
v	Need to enhance the average farm power availability to minimum 4.00 kW/ha to assure timeliness and quality in field operations by 2030.	<p>Our plan and strategies to achieve the targets and be equivalent of that of the developed countries are as below:</p> <ul style="list-style-type: none"> • Improvement in the precision, ergonomic design and quality of small farm equipment and machinery for major crops and operations. Design of multi-utility farm equipment and machinery will done on priority. • Efficient rental/contract service model for tractor and farm machinery for their availability on marginal and small farms like car rental services. • Intensive frontline demonstrations and hands on trainings and encouragement to rural youths/farmers for establishing the custom hiring centres • Liaoning with manufactures for fabrication and commercialization of the improved machines. • Scheme “Sub-mission on Agricultural Mechanization” is being operated by DA&FW for encouraging procurement of the farm equipment/machines by farmers in states at subsidized rate. Provision of special credit support at lower interest rates to farmers for purchase of tractor and farm machinery by them shall help to get the target achieved.
vi	Need of incentives and policy	The Policy seeks to actualise the vast untapped potential of Indian

	support	<p>agriculture and aims at achieving a growth rate in excess of 4 per cent per annum in the agriculture sector. The government of India provides a variety of incentives/ subsidies on equipment, irrigation, fertilizer, seed and short term and long term loan/finance for agriculture.</p> <p>Under Scheme “Sub-mission on Agricultural Mechanization”, the farm equipments/machines are supplied at subsidized rate to the farmers. Policy papers on secondary Agriculture is also being made by National Academy of Agricultural Sciences and will be submitted to DAF&W for implementation.</p>
vii	Establishment of farm machinery bank	<p>Under Scheme “Sub-mission on Agricultural Mechanization”, the financial assistance is provided for establishing Farm Machinery Banks for Custom Hiring at appropriate locations. The financial assistance is also provided for establishing hi-tech machinery hubs for high value crops like sugarcane, cotton etc.</p>
viii	Single window clearance for approval of equipment/machines procurement	<p>The Central DBT Portal for Agriculture Machinery Mechanization (maintained by DA&FW) has been well received in India as one of the important elements of modernization of agriculture. The portal helps in single window clearance for approval of equipment/machines procurement of Individual farmer/CHCs. However present day’s electronic agricultural equipment’s/ gadgets probably require clearance of department of electronics as well as DA&FW, which requires to be simplified.</p>
ix	Manufacturing units being established in the low mechanization area needs to be supported by extending tax and duty sops.	<p>Under Scheme “Sub-mission on Agricultural Mechanization”, the financial assistance is provided for establishing farm machinery bank and Hi-tech machinery hub by</p>

		manufacturers.
x	Banks need to develop hassle free loan origination and disbursement process for tractors and farm machinery on individual ownership basis or custom hiring basis.	The trainings are imparted to the rural youth/farmers for establishing custom hiring centres and applying for different loans/supports from different sources. The state government of Madhya Pradesh helped in financing of loan to interested entrepreneurs with back ended subsidy (up to Rs 10 lakhs).
xi	Need to innovate custom service or a rental model by institutionalization for high cost farm machinery.	The multi-language Mobile App platform ' FARMS- Farm Machinery Solutions ' has been developed by DA&FW. It facilitate local farmers and citizens of the different States across the country with the Custom hiring services of Farm Machinery Banks, Custom Hiring Centres and Hi-tech Hubs established under the various Schemes of DA&FW without any computer support system. Our institutes are giving technological support in establishing such centers.
xii	Large-scale rural entrepreneurship for custom hiring operation of agricultural machinery needs to be developed at a faster pace.	Mobile App " Krishi Yantra Mitra " has been developed by ICAR-CIAE, Bhopal on Farm Machinery Package for Different Agro-climatic Zones in India. It can be used for selection of package of farm machinery according to cropping system [State wise, agro-climatic zone wise, district wise, cropping pattern wise and power source wise model farm machinery package included economic parameters (machine cost, per hour operating cost, hiring rate, total annual cost and net return, break-even analysis, payback period)]. It is helpful for Agricultural machinery custom hiring owners, farmers, manufacturers, agriculture extension officials etc.
xiii	Need for quality manufacturing and after sales service support for	<ul style="list-style-type: none"> • To ensure quality manufacturing, the authorised farm machinery

	reliability of farm machinery.	<p>testing centres test the commercial equipment/machines for their certification as per the prescribed standard.</p> <ul style="list-style-type: none"> • Institute-manufacture interaction meets at regular intervals ensure that manufacture get information on new development and take licence of improved equipment for manufacturing, training on services and supports after sales.
xiv	Streamlining of testing procedure, training of engineers and testing of farm equipment.	The Institutes have established the test centres of agricultural machine and regularly testing the machines for certification. The scientists are also involved in updating/making standards for agricultural machines regularly through BIS.
xv	Technologies are changing fast so there is need of Up-gradation of Testing Centres	There is recognized test centres of agricultural machine at Institute for testing commercial machines. They are updating their facilities from their own resources, which is slow. If financial supports are given time to time, the upgradation process shall get accelerated.
xvi	There is a need to enhance infrastructure structure and trained manpower for research and development on Automation/sensor based agriculture/ robot in agriculture. Opening of National Institute of Agricultural Robotics & AI is urgent required to keep pace in development in agriculture at International level.	<p>A centre for 'Agri-electronics and Automation in Agriculture' has been created at ICAR-CIAE, Bhopal and a department of sensor and automation engineering has been established at ICAR-CIPHET Ludhiana. A new ARS discipline of "electronics and instrumentations" for selection of scientists through all India Examinations has also been started. We are working in these areas with very limited capacities.</p> <p>Our lands are highly fragmented and will get further smaller and smaller in time to come. Tiny robots and AI for Indian Farm Operations in future are urgently needed. A concerted effort with multidisciplinary approach is</p>

		needed for timely development. Thus a proposal for The National Institute of Agricultural Robotics and AI was submitted in SGoS- 8 Vision India-2047 initiative of Hon'ble Prime Minister of India. Request Hon'ble minister to recommend the same to Government to take initiatives on priority.
xvii	Present thrust area of work is development of sensor, robot and AI based equipment/machinery/precision technologies, which requires substantial increase in funds allocation.	Scientists have initiated some work on automation, sensors and robotic application in agriculture and precision technologies as mentioned above with the available limited budget.

RECOMMENDATIONS/OBSERVATIONS

RECOMMENDATION NO. 1

STATUS OF AGRICULTURE MECHANIZATION IN INDIA

The Committee note that Agriculture Mechanization is essential to modern agriculture to increase the productivity and for making judicious and cost effective use of inputs like seeds, fertilizers, chemicals & pesticides and natural resources like water, soil nutrients, etc. The Committee also note that for the purpose, the Government have undertaken several developmental Programmes, Schemes, reforms at policy level with the intent and focus to increase employment and income of the farmers.

The Committee further note that India accounts for only about 2.4% of the World's geographical area and 4% of its water resources, but has to support about 17% of the world's human population and 15% of the livestock. Agriculture is an important Sector of the Indian economy, approximately accounting for 20% of the Nation's GDP. The Committee also note that Agriculture in India is currently growing at an average Compound Annual Growth Rate (CAGR) of 2.8%. About half of the population relies on agriculture as its principal source of income.

The Committee note that the overall Agriculture Mechanization Level of the country is 47% which is comparatively lower than that of other developing countries such as China (59.5%) and Brazil (75%). Farmers need complete mechanization package for major crops. The Committee also note that contribution of Agricultural Mechanization in India leads to saving in seed 15-20%, in fertilizer 15-20%, improvement in germination rate 7-25%, saving in time 20-30%, in weed 20-40% in labour 20-30%, increase in cropping intensity 5-20% and increase in crop yield 13-23%.

There are 86% Small and Marginal Farmers having less than 2 Hectare of land holdings. Unless machines appropriate for small holdings are made available or substantial farm amalgamation takes place, it is difficult for the Small

and Marginal Farmers to purchase their own machinery. The Committee desire that Farm Machinery for majority of the farmers, who are Small and Marginal Farmers and who do not have adequate funds to purchase capital intensive implements should be developed and further incentivized.

The Committee have been apprised of the fact that if we compare our country with the developed nations then till date on an average only 47% Agriculture Mechanization has been done and it is expected that another 25 years are required to achieve the level of 75-80% mechanization from the present level of 47%. The Government has taken various initiatives and is helping farmers by providing subsidy to procure machinery to improve farm input and farm - power availability.

The Committee do feel that economic growth in Indian Agricultural Sector lags behind the parallel growth in Industry and Services Sector, creating an ever widening rural-urban income disparity. The Agricultural Mechanization plays a key role in improving agricultural production, productivity and efficiency. The Committee, therefore, recommend that the Government should strive hard to promote Agricultural Mechanization by according priority for development of small equipments/machines for Small and Marginal Farmers as there is an urgent need to bring in quality and value addition of the farm produce enabling the farmers to take second and subsequent crops making agriculture more attractive and profitable. Apart from this the Committee strongly desire that the Government must strive hard to achieve a level of 75% in farm mechanization from the present level of 47% in a much shorter period than that which has been stated by the Department to be 25 years.

RECOMMENDATION NO. 2

AGRICULTURAL EQUIPMENT MARKET GROWTH

The Committee observe that the Indian Agricultural Equipment Market is experiencing a rapid growth with strong potential for future growth as well. The demand for Agriculture Machinery in Asia-pacific Region was more than twice

than in any other Region. The tractors, power tillers, combine harvesters, rotavators, threshers and rice trans-planters are some of the equipments for which a surge in demand has been witnessed over the past few years in our country also.

The Committee also note that no formal study has been conducted to assess the farm mechanization in the country. However, one objective has been mentioned in the Impact Study conducted for Department of Agriculture and Farmers Welfare (DA&FW). In the Report submitted by M/s WAPCOS Limited in August 2020, data of farm power availability (state wise, district wise) has been provided through which the state-wise mechanization gap has been identified and strategies have been formulated. However, a nation-wide study has not been made to make a proper plan based on need and gap. A proposal by ICAR has been submitted to DoA&FW for this purpose. The Committee feel that there is an urgent need to conduct a systematic study to know the Mechanization Level in the country in purely objective terms.

The Committee also suggest that the Department must look into the proposal of ICAR submitted to DoA&FW regarding State-wise mechanization gaps identified along with strategy so that real-time data can be procured to prepare hassle free implementable plan for requisite mechanization for Small and Marginal Farmers.

RECOMMENDATION NO. 3

PORTABILITY OF FARM EQUIPMENTS SUITABLE FOR SMALL AND MARGINAL FARMERS

The Committee observe that the Small and Marginal Agricultural Land Holdings (less than 2 Hectares) account for 86% of the total Operational holdings *i.e.* 47% of the total operated area. The average farm size in India is small (1.08 Ha). The Committee also observe that the farm machinery is very costly and small farmers find it difficult to purchase these equipments, as they are not in a position to use the equipments due to poor purchasing power. The Committee

further note that the Government has introduced custom hiring of farm equipments, wherein a group of farmers can own and share the machines among themselves at mutually agreed charges by maintaining the Farm Machinery Bank.

The Committee also note that Farm Machinery standardization is a multi-ministerial complex issue. Government has to make a concrete policy in order to enforce compatibility/matching i.e. interchangeability in the manufacture of Agricultural Implements. Manufacturing of critical Components needs to be standardized and encouraged for mass production by medium and large-scale manufacturers. The Committee further note that it will also help in setting up of ancillary units, which can specialize in the manufacture of these standard Components thus increasing the product spectrum and enhance employment opportunity. The Committee, therefore, recommend the Ministry to find solution to the Multi-ministerial complex issue. The Committee feel that this can be achieved by standardization of design of equipments/attachments at Bureau of Indian Standards (BIS) level and implementation of Standards at the Manufacturer levels and further, testing of equipment / attachment / parts manufactured by different manufacturers for ensuring their adherence to the BIS standards specifications. The availability of standard parts makes production simpler and improves components/attachments interchangeability and training of manufacturers in manufacturing technology on use of jigs-fixtures, die-punches, templates and other tooling aids for improving quality and compatibility/matching.

The Committee desire the Government to follow up with other allied Government Departments and try to find portability of farm equipments suitable to Small and Marginal Farmers as they are not in a position to buy huge farm equipment and cannot use these equipments in a cost effective way as their land holdings are very small. The Committee would like to be apprised of the concrete and specific action taken by the Department in this regard.

RECOMMENDATION NO. 4
BUDGETARY ALLOCATION FOR PROCUREMENT OF AGRI-EQUIPMENT

The Committee note that the Government is helping farmers by providing subsidy to procure machinery to improve farm input and farm power availability. The Ministry has allocated an amount of Rs. 5490.82 Crore from the year 2014-15 to 2022-23 for this purpose.

The Central DBT Portal for Agriculture Machinery Mechanization (maintained by DA&FW) has been well received in India as one of the important elements of modernization of Agriculture. The Portal helps in Single Window clearance for approval of equipments/machines procurement of Individual farmer/CHCs. However, present day's electronic agricultural equipments/gadgets probably require clearance of department of electronics as well as DA&FW, which requires to be simplified.

The Committee appreciate the idea of using Direct Benefit Transfer (DBT) Portal as a Single Window clearance for the approval of equipments/machines procurement by Individual farmer/Custom Hiring Centres. However, the Committee notice that for procurement of electronic agricultural equipments/gadgets, clearance of the Department of Electronics is also required. The Committee think that there must be some mechanism software with an automatic link in the DBT Portal for Department of Electronics to facilitate the clearance and approval in one go.

RECOMMENDATION NO. 5
TRAINING AND ORGANIZING DEMONSTRATIONS

The Committee note that the Department of Agriculture and Farmers Welfare is providing training and organizing demonstrations in the area of Farm Machinery through its four dedicated Farm Machinery Training and Testing Institutes (FMTTIs) Tractor Nagar Budni, Madhya Pradesh, Northern Region Farm Machinery Training & Testing Institute Sirsa Road Hissar, Haryana, Southern Region Farm Machinery Training & Testing Institute Anantapur, A.P and the North Eastern Region Farm Machinery Training & Testing Institute, Assam. The

Committee note that the Budget is being allocated for all 4 FMTTIs since 2014-15 to 2022-23. For the Financial year 2014-15 Rs. 32.87 Crore, for 2015-16 Rs. 44.29 Crore, for 2016-17 Rs. 43.62 Crore, for 2017-18 Rs. 52.58 Crore for 2018-19 Rs. 59.71 Crore, for 2019-20 Rs. 53.34 Crore, for 2020-21 Rs. 56.98 Crore, for 2021-22 Rs. 54.55 Crore and 2022-23 Rs. 52.01 Crore has been allocated. The Committee has noted that funds allocation almost at constant level for the past few years and there has been some reduction in allocation of funds from 2021-22 onwards as compared to the funds allocated for the Financial year 2018-19 and 2020-21. The Committee have noted that there has been decrease in the fund allocation for the year 2021-22 and 2022-23 as compared to the year 2020-21.

The Committee further note that these Institutes are giving demonstrations on the advantageous usage of Farm Mechanization to Rural Youth and Farmers and encouraging for training them to establish the Custom Hiring Centres. The Committee feel that the Department should look into the issue of consistent and adequate allocation of funds and that the Department should impress upon the Finance Ministry not to reduce the budget allocations for this purpose. The Committee, therefore, recommend that for over all development of the mechanization of Agriculture, adequate funds be allocated and these funds should be used judiciously.

RECOMMENDATION NO. 6

RESEARCH AND DEVELOPMENT FOR SMALL AND MARGINAL FARM MECHANISATION

The Committee observe that the benefits of Research and Development for Small and Marginal Farmers are slowly percolating to villages and the level of mechanization in the country is increasing. The promotion of newly developed technology depends upon the state policy. ICAR has been constantly trying to popularize and promote its developed technologies and machines through the developmental Programmes including SMAM.

The Committee further note that the awareness is being created among farmers about improved farm equipments and farm mechanization regularly through ICAR Institute, 25 All India Coordinated Research Projects (AICRP) Centres of Farm Implement and machinery, 9 AICRP Centre of Utilization of Animal Energy by field demonstrations. Kisan Melas (731 Centres) also create awareness about Farm Mechanization among farmers in their respective districts.

The Committee also observe that the Department has Developed 158 improved equipments/machines, commercialized 47 technologies, manufactured 18500 machines and supplied to different centres, conducted prototype feasibility testing of 76 improved farm equipments for their adoption at 25 All India Coordinated Research Projects, Issued Test certificates of more than 400 commercial machines, Trained 7369 farmers by 188 training programmes, organized 16 Entrepreneurship Development Programme on Custom Hiring benefitting 450 rural youths, conducted Frontline Demonstrations of 105 improved farm machinery in 11278 ha in 4386 locations, 6575 farmers benefited by the demonstration programmes, Technologies- demonstrated to 10 lakh farmers through Kisan mela industries meet and agri-exhibitions during the last five years. The Committee feel that as per the statistics it comes to 2 lakh farmers per year, which is very negligible keeping into account the huge size of Indian peasantry. The Committee, therefore, desire that the Department should involve other agencies at District, Block and Village level, to give Technological Demonstration to all farmers at Grass Root Level. The Committee also feel that pamphlets and printed material in respect of new research in the field of machinery and tools along with a list of popular farm equipments/machines/tools for the use Small and Marginal Farmers be made available at all KVKs at District level.

The Committee observe that the proportion of Budgetary Allocation (Revised Estimates) made in favour of the Department out of the Total Budget (RE) of the Government of India has been reduced from 0.32% in 2018-19 to 0.29 % in 2019-20 and further to 0.22% in 2020-21. Further, the Committee note that the Department had proposed for the year BE 2021-22 Rs. 10241.68 Crore but has

been allocated Rs 8513.62 Crore. Likewise, the Proposed RE for 2021-22 was Rs. 9330.53 Crore, but the Government allocated Rs. 8513.62 Crore. Similarly, for the period 2022-23, the BE proposed was 9698.91 Crore and BE allocated was Rs 8513.62 Crore. This has resulted in proportionate reduction in inter-sectoral allocation within the Department. The Budget provided for R&D to Farm Mechanization Scheme (ICAR-CIAE, Bhopal + 4 AICRPs+ 2 CRPs) during last four years shows around 30% less fund allocation during the year 2022-23 as compared to 2019-20. There has been continuous reduction in funds allocated for the Scheme during last few years i.e. for 2019-20 the allocated amount was Rs. 2177.10 Lakh, for 2020-21 Rs. 1828.10 Lakh, for 2021-22 Rs 1797.14 Lakh and for 2022-23 (BE) Rs. 1586.64.

The Committee note that the Secretary, Department of Agricultural Research and Education had written DO letters dated 21.01.2022 and 11.11.2021 for additional allocation of funds to the Department. The issue was also discussed during the Pre-budget Meeting held for discussion of expenditure ceilings with Secretary Expenditure and the Department is continuously requesting the Ministry of Finance for enhanced budgetary allocation through various means available in Government set up. The Committee therefore, recommend that the Department should impress upon the Ministry of Finance about the need of the hour for investing money in R&D for Farm Mechanization in general and particularly for Small and Marginal Farmers, as mechanization plays a key role in improving agricultural production and productivity.

RECOMMENDATION NO. 7

ESTABLISHMENT OF DIRECTORATE OF AGRICULTURAL ENGINEERING

The Committee note that at present Directorate of Agricultural Engineering exist in two States (Madhya Pradesh and Tamil Nadu). The Committee also note that ICAR is pursuing the case through the Ministry and the Hon'ble Union Minister had sent a DO letter to all the Chief Ministers of States to establish a Directorate of Agricultural Engineering in their States.

The Secretary, Department of Agricultural Research and Education (DARE) and ICAR Central Institute of Agricultural Engineering are also pursuing the issue

through different forum and writing letters to different State Governments. The Committee observe that delivery points at Block and District Levels in case of Agricultural Machinery are almost missing. There is no engineering manpower to demonstrate, train, help in repairs/maintenance and guide farmers at their doorstep. There is an urgent need of Agricultural Engineers at Block and District Levels. The Committee, therefore, recommend that to monitor and implement the government policy and Programme of mechanization more effectively and efficiently, a Directorate of Agricultural Engineering is needed in each State and instead of Sub-scheme on submission of Agricultural Mechanization, Government should have full-fledged Agriculture Mechanization Scheme to accelerate the process. The Committee would like to be apprised of the action taken in this regard.

RECOMMENDATION NO. 8
UPGRADATION OF TESTING CENTRES

The Committee note that there is need for streamlining of testing procedure, training of engineers and testing of farm equipments as technologies are changing fast and there is need for up-gradation of Testing Centres. The Committee also note that Test Centres of Agricultural Machines have been established at the selected Institutes for regularly testing of the machines for certification. Scientists are involved in evolving/updating standards for Agricultural Machines regularly through Bureau of Indian Standards. The Committee also note that these recognized Test Centres of Agricultural Machine Institutes are slowly upgrading their facilities from their own available resources. If financial support is given from time to time for this purpose, the upgradation process shall get accelerated.

The Committee feel that some mechanism should be evolved by the Government to allocate funds to these Institutes for testing Commercial Machines and upgradation of these testing centres by looking into the issue of non-availability of financial support. The Department should impress upon the Ministry of Finance to allocate the required funds so that the objective of

Upgradation of Testing Centres can be achieved. The Committee would like to be apprised of the action taken in this regard.

RECOMMENDATION NO. 9

ROLE OF SUB-MISSION ON AGRICULTURAL MECHANIZATION (SMAM)

The Committee observe that the Government is implementing "Sub-Mission on Agricultural Mechanization (SMAM)" for which 40-50% of the cost of the equipments is being provided to the Small and Marginal Farmers for the purchase of Tractors, Power Tillers, Combine Harvesters, Rotavators and Rice transplanter. The Committee also note that the SMAM Scheme is implemented through State and UT Governments. SMAM has Central Sector Schemes Component, in which Government of India contributes 100%, whereas in case of Centrally Sponsored Schemes Government of India contributes 60% and States contribute 40% except for the North Eastern States and Himalayan region States where it is 90% (Central Share) and 10% (State Share).

The Committee further note that Additional subsidy of 10% is provided to Small & Marginal Farmers over and above to general category farmers. The Small and Marginal Farmers are also using Tractors on rent basis. The Committee also note that SMAM has now been merged with the Rashtriya Krishi Vikas Yojana (RKVY) w.e.f. 30.09.2022. The Committee note that since the implementation of SMAM in 2014-15, total Rs. 5377.7 Crore has been released under SMAM against which 14,24,179 Machines were distributed.

The Committee are of the opinion that in order to achieve the objective of increasing level of Farm Mechanization for the Small and Marginal Farmers, and with a view to offset the adverse economics of scale, arising due to small land holdings and high cost of individual ownership, the Government must promote low cost farm equipment. The Committee, further desire that the Government should try to promote this Scheme (SMAM) throughout the country by giving it wide publicity amongst the farmers so that they can take avail maximum benefits available on the purchase of Farm Equipments. However, the Committee further desire that with the merger of SMAM in RKVY, the mandate of SMAM should be kept intact and not diluted.

RECOMMENDATION NO. 10
CUSTOM HIRING CENTRES AND FARM MACHINERY BANKS

The Committee observe that one of the major objectives of SMAM is to promote custom hiring of farm machinery centres and Farm Machinery Banks (maintain a set of required equipments and use on sharing basis), so that Small and Marginal Farmers can get the benefits of Agriculture Mechanization. The Custom Hiring Centres have been established under SMAM and it has proved to be a successful model in some States. The Committee also note that Tractor and self-propelled high capacity farm implements and machinery are being promoted on custom hiring basis for use by small farm holders without owning the high value farm equipments/machines. The financial assistance @40% of the Project Cost is also provided to rural youth and farmers as an entrepreneur to own and run Hiring/Custom Hiring Hubs/ Centres.

The Committee further note that Establishment of Custom Hiring Centers/Farm Machinery Banks scheme has enabled farmers to access/ hire Hi-tech and high value machines, which cannot be purchased by the individual farmers. Since 2014-15 to till date total 37,097 Custom Hiring Centres have been established under SMAM.

The Committee note with satisfaction that Farm Machinery Banks have been established in almost all the States except the Union Territories of Ladakh and Dadra & Nagar Haveli. The States like Andhra Pradesh, Tamil Nadu, Haryana, Chhattisgarh, Madhya Pradesh and UP are the front runners in establishing these Centres. The Committee further note that a well equipped Custom Hiring Centre provides Farm Mechanization support to neighboring 100-200 farmers covering about 200 ha. in a cropping season.

The Committee also observe that a total of 17727 Farm Machinery Banks have been established at Village Level and number of Hi-Tech Hubs established is 403.

The Committee do feel that in spite the best efforts of the Government, the benefits of Farm Machinery banks have not percolated to Districts, Talukas,

Panchayat and Gram Sabha Levels. The Committee feel that majority of the farmers are not aware of the benefits of the scheme of Farm Machinery Banks and are not able to benefit themselves from the advantages of scientific development. The Committee, therefore, recommend that wide publicity of the benefits of this Scheme should be given amongst all farmers especially, the Small and Marginal Farmers through social and electronic media. Moreover, the Committee do desire that an App like 'Krishak Mitra' be developed to be used by Small and Marginal Farmers to locate and contact the Custom Hiring Centres/ Farm Machinery Banks in their close vicinity.

RECOMMENDATION NO. 11
FARM POWER AVAILABILITY

The Committee observe that there is a linear relationship between availability of Farm power and Farm yield. Therefore, there is a need to increase the availability of farm power from 2.49 KW per ha (2018-19), to to 4.0 KW per ha by 2030 to cope up with increasing demand of food grains. About 86% of the total land holdings are in Small and Marginal Size Groups, which need special efforts for its mechanization. The Committee also note that the National (average) Farm power availability is 2.4888 kw.

The Committee note that there is an urgent need to enhance the average farm power availability to minimum 4.00 KW/Ha to assure timeliness and quality in field operations by 2030. The Committee notice that the share of Tractor and Electric Motor in farm power availability increased from 6.8% to 45.8% and 14% to 26.8%, respectively.

The Committee do observe that Agricultural Productivity is directly correlated to farm power (mechanical) availability. Hence, to increase productivity in different crops, the available farm power through mechanization needs to be increased. The Committee further observe that Government is training the farmers for different mechanization in different States through KVKs and providing subsidies for encouraging the availability of machinery to reduce disparity of farm power availability between the States. The ICAR is having an umbrella MoU with State Agricultural Universities to implement All India

Coordinated Research Projects (AICRP) Scheme for locating specific research training centres. The Committee note the wide gap of power availability, for example, Punjab is having 6.011 KW/ha and Mizoram 0.693 (KW/ha). The Committee, therefore, feel that with the increase in power supply to Agriculture, more tasks can be completed at the right time and greater areas can be farmed to produce greater quantities of crops while conserving natural resources alongwith substantial savings on many fronts. The Committee would like to be apprised of the action taken in this direction.

RECOMMENDATION NO. 12
PROMOTION OF RURAL ENTREPRENURSHIP

The Committee note that the high cost farm machinery is capital intensive and majority of Indian farmers are not able to acquire these assets. The Committee also note that matching equipments for tractors, power tillers and other prime movers are either not available or farmers are forced to make inappropriate selection in the absence of proper guidance, resulting in high input cost of production.

The Committee also note that the quality and after sales service of farm machinery are the other concerns as the majority of farmers are cost conscious. There are inadequate service centers for proper up-keep of the machinery. In addition, the inability of local low cost manufacturers to come up to the levels of standard designs of equipments also poses a big challenge to Farm Mechanization.

The Committee also find that a software i.e. Mobile App Krishi Yantra Mitra has been developed for Agro-climatic Zone wise, which should be given wide publicity and its benefit conveyed to all the farmers. Further, the Committee desire that in order to improve the quality of the machines and reduce frequent breakdowns, testing centres for the commercial machines/equipments as per BIS standards specifications should be set up in all parts of the country. ICAR Institutes and manufacturers of farm equipments should have interaction at

regular intervals to ensure that manufactures get information on new developments in the field.

The Committee are of the considered opinion that there is an urgent need to promote Rural Entrepreneurship for rural employed youth who are either under employed or unemployed. Keeping into account a huge demand for skilled workers in rural area particularly in Agro and Allied business thrust is needed on Agri-entrepreneurship so that job opportunities are created and made available to these rural unemployed youth. The Committee think that it will reduce migration of rural people to urban areas in research of job and promote rural development by way of employment in villages itself to a great extent.

RECOMMENDATION NO. 13

SOIL PLANT ANALYSIS DEVELOPMENT (SPAD)

The Committee observe that with regard to development in precision and robotic machines, the Department had made Soil Plant Analysis Development (SPAD) Meter for checking Nitrogen status and spectral reflectance based variable application system developed by ICAR - Central Institute of Agricultural Engineering, Bhopal. The Committee also note that the SPAD Meter is a hand held low cost instrument and single button press will give readings. Further, Advisory Services/ User Manual will be provided by KVKs or Block Level Agencies/manufacturers. The Committee further note that the Department has given license to manufacturers for manufacturing the SPAD Meter to be made available in the market for different stake holders.

The Committee would like to be apprised of by when the manufacturers who have been awarded license will start manufacturing of the SPAD Meter and sell the same in the open market. The Committee feel that the SPAD Meter will be a boon to farmers especially Small and Marginal Farmers. The Committee desire the Machines (SPAD Meter) to be made cost effective.

RECOMMENDATION NO. 14
LOW HORSE POWER TRACTORS

The Committee note that the Tractors are most important Machines for Agriculture as these performs various farm operations. The selection of Horse Power for Tractor depends upon the size of the land and farm applications. The Committee note that the average farm size in India is small (1-08ha) and the small and marginal holdings of less than 2 Hectares account for 86% of the total operational holdings. The Committee feel that for Small and Marginal Farmers buying the Farm Equipments even after subsidy is very expensive. The Committee also note that Tractor parts and Components attract GST of 12%. The Committee, therefore, recommend that GST for Tractor parts and components be reduced suitably for the Tractors upto 40 hp. in order to bring down the cost of such Tractors. The Committee feel that this will not only help the Small and Marginal Farmers but also provide the much needed succour to them for buying the most important Farm equipment.

RECOMMENDATION NO. 15
AGRICULTURE RESEARCH SERVICE (ARS)

The Committee observe that a centre for 'Agri-electronics and Automation in Agriculture' has been created at ICAR-CIAE, Bhopal and a Department of Sensor and Automation Engineering has been established at ICAR-CIPHET, Ludhiana. A new Agricultural Research Service (ARS) discipline of "Electronics and Instrumentations" for selection of scientists through all India Examination has also been started and the Government is working in these areas with very limited capacities.

The Committee feel that Automation is the need of the hour in Agriculture as it not only improves harvest time and also improves efficiency and productivity both. The Committee, therefore, recommend that the Government should train more engineers in field of Electronics and Instrumentation and for this the recruitment process of ARS should be taken up vigorously to meet the requirement of engineers.

RECOMMENDATION NO. 16

THE NATIONAL INSTITUTE OF AGRICULTURAL ROBOTICS AND ARTIFICIAL INTELLIGENCE (AI)

The Committee note that our lands are highly fragmented and will get further smaller and smaller in time to come. Tiny robots and Artificial Intelligence (AI) for Indian Farm Operations in future are urgently needed. A concerted effort with multidisciplinary approach is needed for timely development in this direction. Accordingly, a proposal for the National Institute of Agricultural Robotics and AI has been submitted in the SGoS- 8 Vision India-2047, an initiative of Hon'ble Prime Minister of India.

The Committee also feel that opening of National Institute of Agricultural Robotics & Artificial Intelligence is required to keep pace in development in agriculture at National and International level.

**NEW DELHI;
14 July, 2023
23 Ashadha, 1945 (Saka)**

**P.C. GADDIGUDAR
Chairperson,
Standing Committee on Agriculture,
Animal Husbandry and Food Processing**

**Standing Committee on Agriculture, Animal Husbandry
and Food Processing (2021-22)**

Minutes of the Twenty-fifth Sitting of the Committee

The Committee sat on Friday, the 2nd September, 2022 from 1100 hrs. to 1250 hrs. in Committee Room '3', First Floor, Extension to Parliament House Annexe, New Delhi.

Present

Shri P. C. Gaddigoudar – Chairperson

Members

Lok Sabha

2. Shri A.Ganeshamurthi
3. Shri Kanakmal Katara
4. Shri Abu Taher Khan
5. Shri Devji Mansingram Patel
6. Smt. Shardaben Anilbhai Patel
7. Shri Pocha Brahmananda Reddy
8. Shri Mohammad Sadique

Rajya Sabha

9. Smt. Ramilaben Becharbhai Bara
10. Shri Kailash Soni
11. Shri Harnath Singh Yadav

Secretariat

1. Shri Shiv Kumar – Additional Secretary
2. Shri Sundar Prasad Das – Director
3. Shri Prem Ranjan – Deputy Secretary

Witnesses

**Ministry of Agriculture and Farmers Welfare
(Department of Agricultural Research and Education)**

	Name	Designation
1.	Dr. Himanshu Pathak	Secretary, DARE&DG,ICAR
2.	Shri S.N. Jha	Dy. Director General (Engg.), ICAR
3.	Shri Pannal Lal Singh	Assistant Director General (Farm Engg.), ICAR
4.	Dr. C.R. Mehta	Director, Central Institute of Agricultural Engineering (CIAE), Bhopal

2. At the outset, the Hon'ble Chairperson welcomed the Members of the Committee to the Sitting convened for taking Oral Evidence of the representatives of the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education) in connection with the examination of the Subject, 'Research and Development in Farm Mechanisation for Small and Marginal Farmers in the Country'. Thereafter, the representatives of the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education) were called in. The Chairperson welcomed the representatives of the Department to the Sitting and apprised them of the provisions of Direction 55 (1) of the Direction by the Speaker, Lok Sabha regarding confidentiality of proceedings.

3. After the witnesses introduced themselves, the representatives of the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education) gave a Power-Point Presentation to the Committee explaining various points/issues relating to the subject. The Power-Point Presentation covered *inter-alia* the following points:-

- (i) Details regarding Number of Farmers and their land holdings in the country;
- (ii) Reasons for decline in Agricultural workers and draught animal population in the country;
- (iii) Subsidy being given to Small and Medium Farmers for the purchase of Tractors, Power Tillers, Combine Harvestors, Rotavators, and Rice transplanters, etc;
- (iv) The role played by the Department in Sub-mission on Agricultural Mechanization (SMAM) and benefits accrued to Small and Marginal farmers through SMAM;
- (v) Strategy to promote Farm Technology to reach each State and Union territories, District, Block and village of the country;
- (vi) R&D activities carried out by the Department for Small and Marginal Farm Mechanization;
- (vii) Average Farm power availability in the country;
- (viii) Challenges faced in Farm Mechanization;
- (ix) Export of Farm Machineries;
- (x) Availability of funds for R&D with the Department;

(xi) Details of the Designated Testing Centres for Performance Testing and Certification established all over the country, etc.

4. Thereafter, the Committee raised several issues/points and sought clarification/information from the representatives of the Ministry/Department as briefly mentioned below:-

- (i) Need for Establishment of Directorate of Agricultural Engineering in each State;
- (ii) Need for opening of National Institute of Agricultural Robotics and Artificial Intelligence;
- (iii) Need for adoption of farm mechanization practices for all types of crops.
- (iv) Need for setting up of prototype Training Centres for Small Farmers for using of Farm Equipments in the Cooperative model;
- (v) Need for demonstration by the KVKs regarding use of Farm Equipments at the village level;
- (vi) Availability of Pamphlets giving details of the Equipments with the KVKs.
- (vii) Need for standardization of Farm Machinery like tractors, power tillers and other farm equipments.
- (viii) Need for bringing the economic benefits of using technologies over the traditional practices.
- (ix) Need for finding solutions to the problems faced by Small and Marginal Farmers with regard to purchase and use of Farm Equipments;
- (x) Need for taking steps to consolidate the fragmented land holdings into Cooperatives for better utilization of farm equipments;
- (xi) Need to provide benefits of Custom Hiring Centres to Small and Marginal farmers and the reasons for not setting up of Custom Hiring Centres in all States/UTs; etc

4. The representatives of Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education) responded to the queries raised by Members. The Chairperson, then, thanked the witnesses for sharing valuable information with the Committee on the subject and directed them to furnish the information on the points/items, which were not readily available with them to the Committee Secretariat by 9th September, 2022, positively.

The Committee then adjourned.

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**STANDING COMMITTEE ON AGRICULTURE, ANIMAL HUSBANDRY AND FOOD
PROCESSING BRANCH
(2022-23)**

MINUTES OF THE SEVENTEENTH SITTING OF THE COMMITTEE

The Committee sat on Friday, the 14 July, 2023 from 1100 hrs. to 1140 hrs. in Committee Room '3', Block-A, First Floor, Extension to Parliament House Annexe, New Delhi.

PRESENT

Shri P.C. Gaddigoudar, Chairperson

MEMBERS

LOK SABHA

2. Shri A. Ganeshamurthi
3. Shri Mohan Mandavi
4. Shri Devji Mansingram Patel
5. Smt. Sharda Anilkumar Patel
6. Shri Rajiv Pratap Rudy

RAJYA SABHA

7. Smt. Ramilaben Becharbhai Bara
8. Dr. Anil Sukhdeorao Bonde
9. Shri Surendra Singh Nagar
10. Shri Kailash Soni

SECRETARIAT

- | | | | |
|----|----------------------------|---|----------------------|
| 1. | Shri Shiv Kumar | - | Additional Secretary |
| 2. | Shri Uttam Chand Bharadwaj | - | Director |
| 3. | Shri Prem Ranjan | - | Deputy Secretary |

2. At the outset, Chairperson welcomed the Members to the Sitting of the Committee. Thereafter, the Committee took up for consideration the following Draft Reports:

* (i) XXXX XXXX XXXX XXXX XXXX

(ii) Draft Report on 'Research and Development in Farm Mechanization for Small and Marginal Farmers in the Country pertaining to the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education)

3. After some deliberations, the Committee adopted the Draft Reports without any modifications and the Committee authorized the Chairperson to finalize and present these Reports to Parliament.

The Committee then adjourned.

*Matter not related to this Report