# Machine Banks in KVKs

## Igniting Rural Youths as Entrepreneurs for Farm Mechanization




ICAR-Agricultural Technology Application Research Institute
Zone-1, PAU Campus, Ludhiana-141 004

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**Authors:**
Rajbir Singh
J.S. Mahal
Arvind Kumar
V.P. Chahal
K.K. Singh

**Inspiration:**
Dr. B.S. Dhillon, Vice-chancellor, PAU, Ludhiana, Punjab.
Dr. A.K. Singh, Deputy Director General, (Agril. Ext.) ICAR, New Delhi.

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Director, ICAR-Agricultural Technology Application
Research Institute, Zone-1, PAU Campus, Ludhiana, Punjab.
Tel: 0161 - 2401018; Fax: 0161 - 2412719
E-mail: zcu1ldh@gmail.com; Atari.ludhiana@icar.gov.in
Website: http://atari1icar.res.in

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# Machine Banks in KVKs

## Igniting Rural Youths as Entrepreneurs for Farm Mechanization

Mechanisation in Punjab has contributed significantly in the development of agricultural economy of the state. But farmers with meagre resources at their command can't go further for mechanisation due to high prices of machines such as tractors, combine harvesters, machinery for management of crop residues, etc. To overcome such problem and at the same time to get the advantages of mechanisation by the needy farmers for the costly machines and implements, some cooperative societies have initiated step toward providing the farm machinery services on rental as well as on custom hiring basis to the farmers. Custom hiring neither needs initial investment nor repair and maintenance cost from farmers. It is well established fact that farm mechanisation helps in enhancing the production and productivity of agriculture. Costly and rarely used (required only for one or two farm operations) machines hinder farm mechanisation. Therefore, farmers, particularly small and marginal farmers cannot afford to purchase due to either higher cost or limited use of a particular machine. In such situation, rural youth or farmers can establish machine bank and provide the same to the farmers

on rental basis. Machine bank is a unit consists of a set of machines, implements and equipment meant for custom hiring.

## Sub-mission on Agricultural Mechanisation (SMAM) – A boost to mechanisation

In the early 1970s, public sector operated custom-hiring service centres (CHSCs) were established in many places in India by state level agriculture input corporations to promote farm machinery use along with the application of fertilizer and other inputs. But in most states, these public rental service centres could not cover their operating costs. As a result, within a few years of their opening, many were closed down when state governments tightened their budgets. By 1980, most of them had ceased to operate. However, Government of India has initiated SMAM in 2014 and revised in 2019 with major focus on 'Promoting custom hiring centres to offset adverse economies of scale arising due to small landholding and high cost of individual ownership'.

SMAM provides suitable financial assistance to rural entrepreneurs, progressive farmer and Self-Help Groups (SHGs) to establish Farm Machinery Banks for Custom Hiring for appropriate locations and crops. There is provision of providing technical assistance from KVKs, enlisted manufacturers, Approved Testing Centres, Farm Machinery Training and Testing Institutes (FMTTIs) and ICAR centres to maintain and train CHC entrepreneurs. Under this mission, CHCs can be established by the manufacturers in public private partnership (PPP) mode.

## Scenario of residue burning and role of machines

Paddy-wheat cropping system is predominant in Punjab and has a lion's share in the rice and wheat contribution to the national food basket. Although mechanised harvesting and threshing of paddy using combine harvesters has reduced the cost of cultivation but also created the problem of paddy straw management. Paddy residue has emerged as a major challenge to the contemporary agriculture in Punjab as disposal or utilisation of the leftover residue in the short window of 10-20 days for timely planting of ensuing crops is a difficult task. Therefore, farmers generally resort to burning of this paddy straw in the field itself. The amount of crop residues generated in India during 2009 was 501.76 million tons and the surplus amount was 140.84 million tons. According to an estimate, 92.81 million tons crop residue burnt in India during 2010 and Punjab, Haryana and Uttar Pradesh are leading states in crop residue burn-

ing (54.52%). Burning of these residues, to clear the field for the next crop, leads to atmospheric pollution, nutritional losses, deterioration of soil health, etc. Whereas, incorporation of this straw can augment fertility of soil; thereby reducing the need of chemical fertilizers worth Rs. 1500-2000/ha. It seems to be a better approach as the air pollution is prevented and soil fertility is improved with the existing residue in the field. IFPRI found that living in an area where crop burning is practiced was a leading risk factor for respiratory disease in northern India and observed that agricultural crop-residue burning (ACRB) leads to over US$30 billion losses in economic value every year and a threefold risk of acute respiratory infection (ARI) to those exposed in the general population. Therefore, it is desirable to shun the residue burning for the benefit of farmers as well as general public at large.

Among the scientific crop residue management options, *ex-situ* (outside the field) management of paddy residue is essentially the mining of essential nutrients from the field and should be avoided. However, *in-situ* (in the field itself) management involves either retaining the residue on field as layer of mulch while sowing the succeeding crop with happy seeder or zero-till drill or mixing/incorporating residue in the soil using reversible plough, disc plough or rotavator. The type of management and machines to be used can be chosen based on the requirements of the succeeding crop. Looking into the seriousness of the issue of residue burning in Punjab, Krishi Vigyan Kendras (KVKs) of Punjab under the aegis of the ICAR-ATARI, Ludhiana have started pioneering work by promoting farm machinery for *in-situ* residue management and drive attention of all the stakeholders to the problem of residue burning on small scale. Machinery for *in-situ* residue management has been the pre-requisite as most of the farmers particularly small and marginal farmers did not have it for the same.

## Concept of Machine Bank in KVKs

Realising the extent and significance of the problem of crop residue burning, Govern-


*Machine Bank at KVK Sangrur*

ment of India launched a Central Sector Scheme on "Promotion of agricultural mechanisation for *In-situ* management of crop residue in the state of Punjab, Haryana, Uttar Pradesh and NCT of Delhi" in 2018. The scheme aims at holistic promotion of agricultural mechanisation for *in-situ* management of crop residue through awareness and capacity building. Under this scheme, there is provision for subsidy for individual farmers (50%) to purchase required machinery and 80% subsidy for establishing CHCs by a group of farmers. The selected KVKs of Punjab, Haryana, Delhi and Uttar Pradesh also involved in the implementation of Information, Education and Communication (IEC) activities for *in-situ* crop residue management.


*Machine Bank at KVK Amritsar*

Machine bank in each KVK has been established to address crop residue burning which requires adoption and use of new especially designed machines by the farmers. The adoption demands knowledge and skills with respect to the operation of machines, their calibration, maintenance and remedies if any problem surfaces. The do's and don'ts of operating machinery is must to know for its long term usage and effective management of crop residues. Moreover, lack of skills may also prevent farmers from adopting machines as they may find the technology complex and tricky. Therefore, capacity building of farmers and machine operator was considered fundamental not only to ensure the timely operations and efficiency in machine usage but also in terms of developing confidence among farmers and machine operators. Machine bank in KVKs also provided these machines free of cost for needy and interested farmers who do not want to burn the paddy straw. Farmers who visit KVK also see the machines which motivate them to seek detailed information about machine. Machine banks also help in the development of rural entrepreneurs who want to establish machine banks for custom hiring. The ultimately machine bank helps the KVKs for laying out demonstrations at strategic locations at large number of farmers field.

## Establishment of machine banks in KVKs

Machines Banks establish in each KVK of Punjab for organising capacity development, demonstrations, exhibitions as well as providing services to the needy farmers. There are 194 Happy Seeders, 108 reversible Mould Board Ploughs, 68 Shrub Master/ Cutter cum Spreader, 121 Mulcher/Chopper, 91 Zero Till Drills and 60 Rotavators available in different KVKs for custom hiring as given in Table1.

***Table 1: Details of KVK-wise CRM Machinery available in Machine Banks***

| S. No. | Name of KVK | Happy Seeder | Reversible M.B. Plough | Cutter cum Spreader | Paddy straw chopper/ Mulcher | Zero Till Drill | Rotavator |
|---|---|---|---|---|---|---|---|
| 1 | Amritsar | 13 | 5 | 4 | 5 | 7 | 4 |
| 2 | Bathinda | 12 | 7 | 3 | 5 | 6 | 6 |
| 3 | Faridkot | 9 | 5 | 3 | 6 | 6 | 3 |
| 4 | Fatehgarh Sahib | 7 | 3 | 3 | 4 | 2 | 2 |
| 5 | Ferozepur | 10 | 7 | 3 | 9 | 5 | 2 |
| 6 | Gurdaspur | 8 | 3 | 3 | 4 | 5 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Hoshiarpur | 8 | 3 | 2 | 3 | 3 | 3 |
| 8 | Jalandhar | 8 | 9 | 3 | 8 | 4 | 2 |
| 9 | Kapurthala | 6 | 9 | 3 | 10 | 3 | 3 |
| 10 | Ludhiana | 7 | 5 | 3 | 7 | 2 | 2 |
| 11 | Mansa | 10 | 8 | 3 | 8 | 6 | 3 |
| 12 | Moga | 10 | 7 | 3 | 8 | 4 | 4 |
| 13 | Muktsar | 10 | 9 | 3 | 9 | 5 | 3 |
| 14 | Nawansha-har | 10 | 3 | 3 | 4 | 5 | 3 |
| 15 | Pathankot | 6 | 2 | 2 | 4 | 6 | 2 |
| 16 | Patiala | 11 | 3 | 4 | 2 | 5 | 2 |
| 17 | Ropar | 10 | 4 | 3 | 8 | 6 | 4 |
| 18 | Sangrur | 11 | 4 | 4 | 6 | 3 | 2 |
| 19 | Barnala | 10 | 3 | 4 | 3 | 2 | 2 |
| 20 | Mohali | 5 | 4 | 2 | 3 | 3 | 2 |
| 21 | Tarn Taran | 10 | 3 | 5 | 2 | 1 | 2 |
| 22 | Fazilka | 3 | 2 | 2 | 3 | 2 | 1 |
| | **Total** | **194** | **108** | **68** | **121** | **91** | **60** |

The brief information about machinery required for in-situ crop residue management, source of power, capacity and purpose for which it is used are given in Table 2.

***Table 2: Farm machinery for in-situ paddy residue management***

| Name of machine | Source of Power | Capacity/ output | Purpose |
|---|---|---|---|
| Happy seeder | Tractor (45 HP or above) | 5.0-6.25 acre/day | Wheat can be directly drilled into combine harvested paddy field without any burning or removal of residue. The loose straw should be uniformly spread in the field before sowing either manually or harvest paddy with combine harvested fitted with Super SMS. |
| Straw cutter cum spreader | Tractor (35 HP or above) | 9-10 acre/ day | It improves the efficiency (20%) of Happy Seeder by chopping and spreading of straw after combine harvesting of paddy. |

| | | | |
|---|---|---|---|
| Paddy straw chopper / mulcher | Tractor (40 HP or above) | 6-7 acre/day | The paddy straw chopper/mulcher chops the straw into small pieces and spread it on the surface. |
| Reversible MB plough | Tractor (45 HP or above) | 5.8-7.25 acre/day | Used to open up unploughed land. Field capacity will depend upon size of implement and soil conditions. |
| Zero-till-Drill | Tractor (35 HP or above) | 7-10 acre/ day | Wheat can be sown directly in the clean paddy field without any tillage operation. It can be used in Basmati harvested field or paddy fields from which straw have been manually removed. |

## Scope for income and employment generation

Machine bank is an innovative solution for farm mechanisation and has tremendous potential for increasing the income of farmers as well as generating employment in rural areas. Rural youth can be attracted for establishing machine banks in their respective villages by submitting the project under SMAM. Rural youth can take the benefit the KVK working in each district of Punjab in order to become entrepreneur by establishing the machine bank.

## *In- situ* crop residue management by KVKs and its outcome


*Machine Bank at KVK Patiala*


*Machine Bank at KVK Sangrur*

KVKs of Punjab already promoting farm machinery for *in-situ* residue management throughout the year on limited scale with the objectives of creating awareness amongst farmers about the ill effects of residue burning on environmental, soil and human


*Machine Bank at KVK Faridkot*


**Machine Bank at KVK Sangrur**

health and to demonstrate available residue management technologies.

However, the scale and intensity of residue management enhanced with the implementation of Central Sector Scheme on "Promotion of agricultural mechanisation for *In-situ* management of crop residue in the state of Punjab, Haryana, Uttar Pradesh and NCT of Delhi" in 2018 and the KVKs entrusted with the execution of the activities under Information, Education and Communication (IEC) component. Under IEC activities, selected villages were targeted to sensitise stakeholders about the harmful effect of residue burning, benefits of *in-situ* residue management and government schemes to procure subsidised machines.

Walls of prominent buildings and structures were painted with catchy slogans benefits of residue management; posters, banners and hoardings were installed; panel discussions and awareness programs were telecasted on DD Kisan and publicity materials were distributed among stakeholders. Thus, stakeholders for all walks of life were engaged for the purpose. School and college students have been in this endeavour by conducting various competitions to draw out their reflections in the forms of posters, slogans, essays, etc. KVKs with these motivated young minds organised awareness rallies/*chetna pheries* in villages to convey the message for *in-situ* residue management. Such rallies also involved distribution of literature on the topic of residue management among farmers and other stakeholders.

Moreover, hands-on trainings for farmers, tractor owners and machine operators organised in which participants were specifically informed about the combo technology

of Super Straw Management System (Super-SMS) and Happy Seeder and its multiple advantages. Similarly, live method demonstrations on operating machines and sowing wheat while managing paddy straw effectively have been organised. Result demonstrations on Happy Seeder sown wheat, Zero-Till drill sown wheat, etc. were also organised at strategic locations in the farmers' fields to exhibit actual field conditions while managing crop residue *in-situ.*

The activities of KVKs of Punjab in participatory mode with farmers and *Panchayat*s resulted into 273 residue burning free villages (less than 80% residue burning in a villages considered as burning free village) as depicted in Fig.1 covering an area of 94701 ha (Fig 2) during 2016 to 2019.

Rural youth can take the benefit the KVK working in each district of Punjab in order to become entrepreneur by establishing the machine bank.Straw Management System (Super-SMS) and Happy Seeder and its multiple advantages. Similarly, live method demonstrations on operating machines and sowing wheat while managing paddy straw effectively have been organised. Result demonstrations on Happy Seeder sown wheat, Zero-Till drill sown wheat, etc. were also organised at strategic locations in the farmers' fields to exhibit actual field conditions while managing crop residue *in-situ.*

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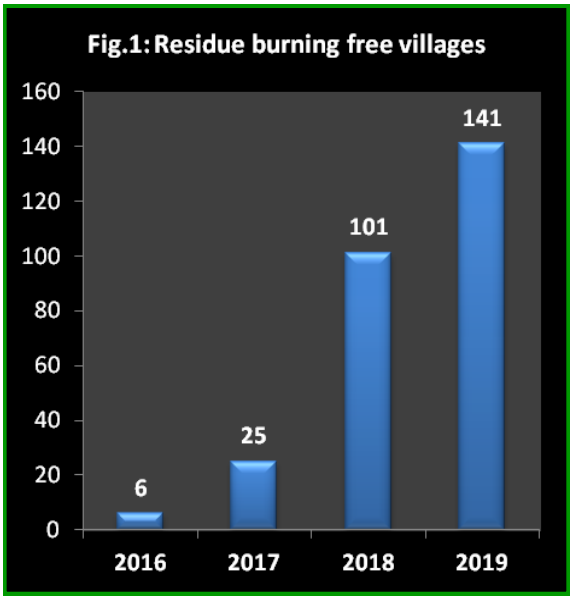
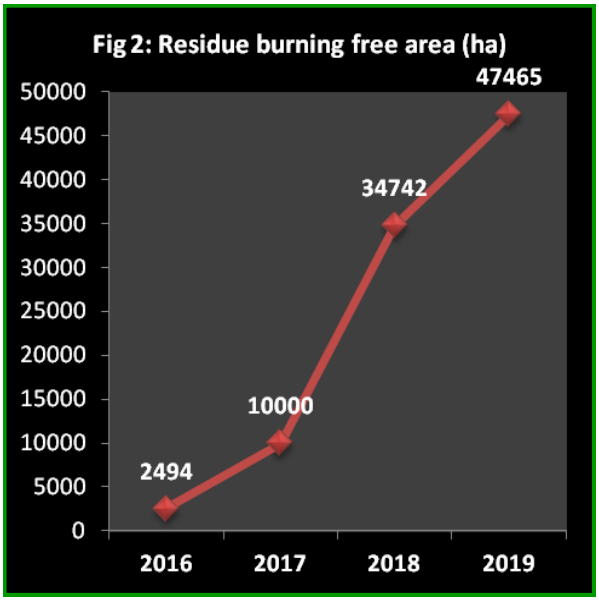


## Machines in fields for Paddy Straw management

*Farmer directly sowing wheat with Happy Seeder*

View of using Rotavator

View of using Rversible M.B. Plough

# Machines Banks at Krishi Vigyan Kendras (KVKs)


*Machine Bank at KVK Amritsar*

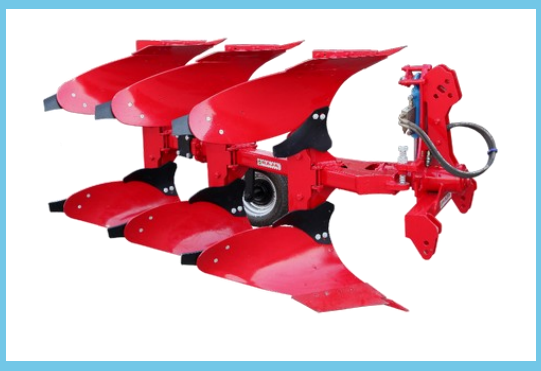

*Machine Bank at KVK Patiala*


*Machine Bank at KVK Sangrur*

## Machines available in Machine Banks


*Happy Seeder*


*Zero Till Drill*



*Reversible M. B. Plough*

*Rotavator*

*Mulcher*

*Cutter-cum-Spreader*

हर कदम, हर डगर
किसानों का हमसफर
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**ICAR-Agricultural Technology Application Research Institute**
**Zone-1, PAU Campus, Ludhiana - 141 004**
Tel.: 0161-2401018, Fax: 0161-2412719
Email: zculldh@gmail.com, atari.ludhiana@icar.gov.in Website: http://atarilicar.res.in