

Report  
on  
improved agricultural implements  
in  
Himachal Pradesh

**REPORT**

**IMPROVED AGRICULTURE**

**IN**

**HIMACHAL PRADESH**



**AGRICULTURE TEAM  
COMMITTEE ON PLAN PROJECTS  
PLANNING COMMISSION  
NEW DELHI  
April 1966**

**REPORT**  
**ON**  
**IMPROVED AGRICULTURAL IMPLEMENTS**  
**IN**  
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**AGRICULTURE TEAM**  
**COMMITTEE ON PLAN PROJECTS**  
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**April 1966**

## LETTER OF TRANSMITTAL

A. P. Jain,  
Leader  
Agriculture Team.

D.O. No. COPP/Agr/F(2)/66  
Committee on Plan Projects,  
Planning Commission,  
Jamnagar House,  
New Delhi.

*Dated the 29th April, 1966.*

My dear Nanda,

I have great pleasure in forwarding herewith the Report of the Agriculture Team on Improved Agricultural Implements in Himachal Pradesh. The Report is the result of the extensive field studies conducted by the Team.

The Report deals with the specific problems relating to research, manufacture, popularisation and distribution of Improved Agricultural Implements. The findings of the Team reveal that the programme of improved agricultural implements is still in its infancy and much remains to be done to bring it on a sound footing. The absence of a well-organised manufacturing programme, continued dependence on the neighbouring States for all types of implements, inadequate research facilities and shortage of trained personnel for carrying out the programme of popularisation and distribution of improved implements are the main factors responsible for the slow progress of agricultural implements in the State. In fact, these aspects, by and large, have been neglected by the Government.

The Team has recommended the strengthening of the Research, Testing and Training Centre, Mandi to accelerate the research work on testing, designing and modification of implements and hand tools, especially suited to the hilly terrain; setting up of an agricultural engineering section in the Department of Agriculture for demonstration and popularisation of improved agricultural implements; manufacture of important agricultural implements, hand tools and garden tools at the Government owned Nahan Foundry; and restarting the training of village artisans at the Gramsevak Training Centre, Mashobra. The Team has also suggested encouragement to private fabricators and rural common facility workshops to take up the production of improved implements, strengthening of the credit facilities available for the purchase of implements, increased participation of village institutions in the programme, provision of adequate service facilities, and intensification of the publicity and propaganda including large-scale demonstrations on cultivators' fields.

The State Government is in general agreement with the recommendations of the Team.

With best regards.

Yours sincerely,

A. P. JAIN

Shri G. L. Nanda,  
Union Home Minister and Chairman,  
Committee on Plan Projects,  
New Delhi.

## PREFACE

This Report is the fifth in the series issued by the Agriculture Team, appointed by the Committee on Plan Projects, Planning Commission for the study of Improved Agricultural Implements, in accordance with the terms of reference circulated to the State Governments *vide* Committee on Plan Projects' letter No. COPP/7/10/62, dated the 12th February, 1963. The Team comprised Shri A. P. Jain, Governor of Kerala (Leader), Dr. Arjan Singh, Shri B. M. Lakshmipathy and Dr. G. V. Chalam (Members).

2. The Team paid visits to the Himachal Agricultural College, Solan; Gramsevak Training Centre, Mashobra; Research, Testing and Training Centre, Mandi; Indo-German Agricultural Implements Workshop, Mandi; Government Foundry, Nahan; and Cluster Centres of the State Department of Industries. The Team also visited a few C.D. Blocks, Government Seed Farms and Co-operative Societies and held discussions with the various Government officers, progressive cultivators, extension workers and representatives of the Co-operative Societies and Village Panchayats to ascertain the actual position and the magnitude of the problem.

3. The Team observed that the existing programme of improved agricultural implements in Himachal Pradesh is still in the initial stages of development. The research work on the testing, designing and modification of implements and hand tools, especially suited to the hilly terrain, has not been taken up vigorously. There are no private fabricators of implements and the Government owned Foundry at Nahan is engaged mainly in the production of sugarcane crushers and Defence equipment. The main source of supply of implements is the adjoining State of Punjab. The training of village artisans at the Workshop Wing, Mashobra is almost at a standstill for want of necessary teaching staff. The Himachal Agricultural College lacks in basic facilities of workshop and equipment for teaching.

4. The Team has suggested the establishment of an Agricultural Engineering Section in the Department of Agriculture for demonstration and popularisation of improved agricultural implements in the Territory. In the field of research, strengthening of the existing facilities at the Research, Testing and Training Centre, Mandi, exhaustive field trials of the imported

(iv)

implements and equipment under the Indo-German Agricultural Project, and intensive design and development work of hand tools have been suggested. It has also been suggested that the Nahan Foundry may be utilized for the manufacture of important agricultural implements, hand and garden tools and their components on a mass scale. The private manufacturers may also be encouraged to take up this work, preferably on co-operative basis, by giving them such facilities as loans, location sites, raw materials, etc. The Team has also suggested the simplification of the lengthy and cumbersome procedure involved in the procurement and distribution of controlled items of iron and steel for agricultural purposes. Strengthening of the credit facilities available for the purchase of implements and hand tools; increased participation of the village institutions in the programme; provision of adequate service facilities; and intensification of the publicity and propaganda are some of the other recommendations made by the Team.

5. We take this opportunity to express our gratitude to the Himachal Government for the facilities extended to the Team. We are particularly grateful to Dr. L. S. Negi, Director of Agriculture; Shri Prem Sagar, Deputy Director of Agriculture (Extension); Dr. B. S. Jogi, Project Officer; and Shri D. N. Zutshi, Research Engineer for their co-operation and assistance to the Team in carrying out this study.

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## CHAPTER I

### GEOGRAPHICAL AND AGRO-ECONOMIC FEATURES

1.1. **Physical features.**—Himachal Pradesh lies in the Himalayan Region of India, with altitudes, ranging from 1,500 feet to 22,000 feet above the mean sea level. It has an area of 10,885 square miles (1961 census), out of which a little over one-third is at an altitude of 10,000 feet and above, thus reducing considerably the land area available for utilization. The Territory is divided into three zones, namely: Outer Himalayan, Inner Himalayan and Alpine pasture. The rainfall in the Outer Himalayan Zone varies from 60 to 70 inches (150—175 cms.) and in the Inner Zone from 30 to 40 inches (75 to 100 cms.). The Alpine Zone remains under snow for about five to six months in a year.

1.2. **Soils.**—According to their location, the soils of the State could broadly be classified as under:—

1.2.1 **Low-hill Soil Zone.**—This Zone extends upto an altitude of about 3,000 feet and is largely located in the Paonta Tehsil of Sirmur, the Balh area of Mandi, the Bhattiyet Tehsil of Chamba, the Kunihar area of Mahasu and the Bilaspur District. The soils in this Zone are sandy-loam to loam in texture and light-grey to brown in colour; not very deep; embedded with pebbles, stones and boulders; mostly situated in the narrow valleys on the banks of rivers or streams; and are well-drained. They are most suitable for raising crops like wheat, maize, sugarcane, ginger and paddy.

1.2.2. **Mid-hill Soil Zone.**—This Zone comprises the soils on hill slopes between an altitude of 3,000 feet and 5,000 feet. They are mostly located in Nahan and Pachhad, parts of Chamba and Churah Tehsils, Jogindernagar and Sarkaghat Tehsils of Mandi and Rampur, Kasampti, Solan and Kotkhai Tehsils of Mahasu. The soil texture of this region is medium-fine, ranging from loam to silt loam, with varying percentages of pebbles and stones, which when large have an adverse influence on the fertility status. They are well-drained and susceptible to severe drought effects. These soils are suited to the production of table potatoes, wheat, maize and stone fruits.

1.2.3. **High-hill Soil Zone.**—This Zone consists of soils at an altitude of 5,000 feet to 7,000 feet and is located in Theog, Jubbal, Chopal and Rohru Tehsils of Mahasu, Rainka Tehsil of Sirmur, Chachiot and Karsog Tehsils of Mandi and parts of Bharmour and Churah sub-tehsils and around Dalhousie in Chamba. These soils are mostly situated on steep slopes and are of fine texture, varying from silt loam to clay loam and are light to dark brown. They are often deep and have good drainage and fertility status. They are generally good for seed potato and temperate fruits.

1.2.4. **Mountainous Soil Zone.**—This Zone comprises the forest soils on high peaks, at altitudes of 7,000 feet to 10,000 feet, in parts of Bharmour, Churah and Chamba Tehsils of Chamba and Karsog and Chachiot Tehsils of Mandi. It provides very good grazing grounds in summer for migrating flocks of sheep. In some areas, potatoes and



temperate fruits are also raised. The soils in these areas are generally shallower in depth than those of the hill slopes. They are silt loam to loam in texture, dark brown in colour and rich in organic matter. The surface drainage is very rapid and the internal drainage very good.

1.2.5. *Dry-hill Soil Zone*.—The Dry Hill Soil area with negligible monsoon rainfall but with heavy snowfall is found in the Chini Tehsil of Mahasu and Pangi sub-tehsil of Chamba. These soils have not so far been scientifically studied. They are considered to be very well suited to dry fruits cultivation.

1.3. *Land Utilization*.—The total geographical area of Himachal is 69.66 lakh acres (1961-62). The forests, which are extensive and form the backbone of the economy in the Territory, occupy 19.05 lakh acres or 27.34 per cent of the land area. The land not available for cultivation, either because it is barren and unculturable or because it is put to non-agricultural uses, accounts for 18.96 per cent. The other uncultivated land, excluding current fallows, constitutes the bulk of the area and occupies 30.19 lakh acres or 43.33 per cent of the total land area. This includes permanent pastures to the extent of 39.6 per cent and culturable waste 2.7 per cent. There is not much of fallow land, which is less than one per cent. The net area sown is only 6.77 lakh acres or 9.71 per cent of the total land area.

1.4. *Irrigation*.—The net area under irrigation in Himachal is 97,059 acres (1961-62) representing only 14.3 per cent of the net area sown or nearly nine per cent of the total cropped area. The gross area irrigated from different sources is 1,68,000 acres, showing an intensity of 173 per cent. Almost the entire irrigation (99.5 per cent) is done by *Kuhls*, some of which are perennial and others run only from July to November. The maximum area under *Kuhl* irrigation is in Mandi District, followed by Sirmur and Mahasu Districts respectively. There is no tank irrigation in any of the six districts. There is also almost total absence of canal and well irrigation, with a negligible area of less than 500 acres, in Sirmur and Bilaspur Districts.

1.5. *Cropping pattern*.—There is a high degree of crop intensity in Himachal. Out of the total cropped area of 10.87 lakh acres (1961-62), as much as 4.10 lakh acres are double-cropped, thus the index of crop intensity in 1961-62 was 160. The principal food crops are wheat (3,52,000 acres), maize (2,88,000 acres), rice (1,13,000 acres), barley (76,000 acres), pulses (72,000 acres), smaller millets (61,000 acres) and ragi (39,000 acres). Thus foodgrains occupy 10.01 lakh acres and account for nearly 92 per cent of the total cropped area. The chief commercial crop of the State is potato, though ginger, sugarcane, cotton, chillies and tea are also grown. The area under potato is steadily going up. Nevertheless, potato cultivation on hill slopes is posing a problem of soil erosion. Cotton and sugarcane are grown on a negligible scale at lower altitude in the places, where climate is suitable for their cultivation. The area under tea is only 2,000 acres. The oilseeds include sesamum, rape, mustard and linseed and account for nearly 54 per cent of the total area under non-food crops. In recent years, there has been a slight shift in the crop pattern, minor millets, oilseeds and pulses giving place to cash and root crops like ginger and potatoes. The area under cotton has shrunk while that under tobacco has expanded.

1.5.1. The limitation of cultivable land and the necessity for supplementary occupations in rural areas offer the greatest scope for the development of horticulture and animal husbandry in Himachal. Fruit production occupies a unique position in the rural economy of the Territory, the area under orchards and vegetables, including potatoes, being 40,621 acres, which is about four per cent of the cropped area under food crops. More attention is now being paid to the development of fruits and vegetables, both for local consumption as well as for export to the plains; milch cattle for milk and milk products; poultry for eggs; piggery for meat and sheep breeding for wool production. Schemes are already under way for the development of mixed farming pattern in Mandi District in collaboration with the Government of the Federal Republic of Germany. New orchards are coming up steadily and the area under vegetables is on the increase especially in this District. The improved types of cattle and sheep have been imported from West Germany for upgrading the local stock. The improved strains of poultry are becoming popular and the egg-production is showing an upward trend.

1.6. Agricultural practices.—Due to isolated nature of the Territory and difficult terrain, agricultural practices and methods of cultivation of various crops, by and large, continue to be primitive. Cultivation is carried on, wherever possible, on the hill slopes and in the valleys. As the agricultural conditions vary considerably in different parts of the Territory from almost plain-level altitudes to over 10,000 feet on the mountain slopes, the time, both of sowing and harvesting and agricultural practices vary with elevation of the fields. The *rabi* crops are usually sown from the middle of September to the middle of December and harvested in April-May at low altitudes and May to July at high altitudes. The *kharif* crops are sown from March to the middle of July and harvested from September to the end of November. In areas, which remain covered with snow in winter, only one crop of wheat or barley is taken in summer season. Barley ripens a month earlier than wheat. The common *rabi* mixtures are wheat and barley, wheat and gram, wheat and mustard and barley and gram. Rice is mainly an irrigated crop but it is also raised, as a rainfed crop. Under rainfed conditions, the seed is broadcast in June and under irrigated conditions, the seedlings are transplanted in July. The rainfed paddy is harvested towards the end of September or early October and irrigated crop from October to November. Maize and millets are sown on the hill slopes with the first showers of monsoons and harvested from the end of September to early November. Sesamum and *kharif* pulses are sometimes sown as subordinate crops with maize, the common mixtures being maize and sesamum and maize and pulses.

1.7. Yields.—The average per-acre yields of almost all the principal crops are rather low, that of rice being (687 lbs.), ragi (424 lbs.), wheat (596 lbs.), gram (264 lbs.), smaller millets (367 lbs.), barley (442 lbs.) and rape and mustard (280 lbs.) in 1962-63. The average yield of sugarcane is hardly 30 per cent of the All-India level. Potato is a very important economic crop of Himachal but its average yield is only around 2,240 lbs. as compared to the All-India average of over 6,000 lbs. per acre.

1.8. Land holdings.—Agricultural holdings in the State are generally very small and the rewards from agriculture poor, except in the case of orchards and vegetables. Although no definite figures of holdings from

1.0 to 10.0 acres are available, yet it is estimated that 90 per cent of the cultivated area is covered by holdings between 1.0 and 10.0 acres as compared to 78.2 per cent of an All-India figure and 36 per cent for that of the Punjab. According to 1956 census, the total number of holdings from 10.0 to 100 acres and above was only 9,520 with 1,68,028 acres as the area owned by them.

1.9. Consolidation of holdings.—The difficult and sloping terrain of Himachal has led to small and scattered holdings with a large-scale terrace cultivation. The small and fragmented holdings have special problems in this region. A cultivator spends considerable time in reaching the sub-units of his holding for various farm operations. This results in considerable waste of time and labour. The lands which lie far away from the main holding have to be kept under crops which are not normally damaged by wild animals and birds. In the remote fields, generally no manure is applied due to heavy cost of its carriage. The fragmented holdings make it impossible to instal labour-saving devices on the land. Their management becomes a burden on the farming. All these factors cause great impediments to the introduction of modern techniques of farming, including use of improved implements and machinery, especially the power machines, and thus resulting into un-economic use of land. This is further handicapped by the fact that on the steep slopes, even bullock-power has restricted utility and most of the field operations, including primary tillage, are done with manual labour. The low yields of almost all the principal crops are partly attributable to the small and scattered pieces of cultivable land. The consolidation of holdings in Himachal therefore could play a significant role for more efficient farming.

1.9.1. The work of consolidation was started in the lag end of the First Plan but the progress achieved is rather slow mainly due to difficult terrain; the growing smallness of fields to be consolidated and reluctance on the part of the farmers to get the land consolidated. The total area to be consolidated during the Third Plan Period is targeted at 3,76,000 acres at a total cost of Rs. 42.52 lakh.

1.10. Agricultural Labour.—There is a total working force of 8.05 lakh persons in Himachal (1961 census). Of this 6.82 lakh are engaged in farm work; 6.71 lakh, *i.e.*, 83.25 per cent as cultivators and only 0.11 lakh *i.e.*, 1.41 per cent as agricultural labour. It is clear that there is only one agricultural labourer for sixty cultivators. Because of the small size of holdings the entire cultivation is done by the cultivators themselves with the help of other family members. The females play a very important role in the agricultural economy of Himachal, and constitute a little over half of the strength of cultivators and one-third of the agricultural labour. During the last decade (1951-61), there was an increase of 17 per cent in the cultivators and a decrease of 30 per cent in the agricultural labour. With the extensive road construction work, the availability of agricultural labour is dwindling down.

1.11. Agricultural Wages.—Under the Minimum Wages Act, 1948, the minimum rates of wages prescribed within the meaning of clause (iii) of sub-section (i) of Section 4 of the Act for the labour employed in agricultural operations within Himachal Pradesh are as under:—

Unskilled labour	.	{	Male adult	Rs. 1.50 per day
			Female adult	Rs. 1.25 per day
			Adolescent	Rs. 1.00 per day

Skilled labour	{ Adult	Rs. 2.00 per day
	{ Clerical staff	Rs. 2.00 per day or Rs. 60.00 per month.

Nevertheless, the rising cost of living has its impact on the agricultural wages in the Territory which have been showing a steady upward trend during the past few years and necessary steps to revise the aforesaid minimum rates of wages are being taken. In actual practice, the average daily wages of the field labour, under the unskilled category, have varied from Rs. 1.79 in 1955-56 to Rs. 2.40 in 1961-62 and those of other agricultural labour from Rs. 1.48 to Rs. 2.25 during the same period. Similarly, in case of skilled labour (carpenters, blacksmiths, etc.), the daily wages have risen from Rs. 2.85—Rs. 3.51 in 1955-56 to Rs. 3.66—Rs. 4.59 in 1961-62. The payment of wages is mostly in kind by the cultivators though these are also sometimes paid in cash for casual work.

**1.12 Bullock Power.**—According to 1961 census, the State had 3.91 lakh of working cattle for a cultivated area of 6.76 lakh acres. This amounts to one working bullock for every 1.7 acres or nearly 60 heads per hundred acres. The small and scattered holdings, difficult terrain, high intensity of cultivation and low draft capacity of the cattle have given rise to an alarmingly high number. Almost each cultivator maintains a large herd of cattle, more as a sign of his social status rather than for their real utility. They are not only poor, but are also not properly maintained and well-fed, as is normally done in the plains. Fodders are rarely grown and the feeding of concentrates to them is seldom done. The main source of their sustenance is grazing in the forest area during summer and hay during winter months. Thus the efficiency and output of the hill cattle is very low and also there is not full work for them all the year round. The bullock power is mainly used for ploughing the land at the time of sowing crops and for threshing only. No other work is taken from them.

**1.13. Agricultural implements.**—The use of agricultural implements in Himachal has not made much headway, as by and large, it has received only scant attention in all the agricultural development programmes. The tillage implements, as in any other hill regions, are crude and primitive and do not attain a reasonable level of efficiency. The wooden plough is still largely in vogue. The iron plough is a rarity and even the number of wooden ploughs is not adequate in the remote and inaccessible localities. According to 1961 census, there were 2,32,721 wooden ploughs and only 3,278 iron ploughs in the whole of Himachal Pradesh. As against one wooden plough for every three acres of cultivated land, there was only one iron plough for every 207 acres. The highest number of 65,593 wooden ploughs was in Mahasu followed by 61,718 ploughs in Mandi District. Of the total number of 3,278 iron ploughs, Chamba accounted for 3,141 ploughs. It is rather strange that the Chamba District, with its comparatively peculiar agricultural conditions and difficult terrain, should have nearly 96 per cent of the iron ploughs while it possessed only 16 per cent of the wooden ploughs as compared to the whole of the Territory. The statistics in respect of iron ploughs in Chamba are apparently not correct and call for more accurate and systematic enumeration. Kinnaur District is very primitive and isolated in the use of implements with only 4,136 wooden ploughs (1.8%) and no iron plough to its credit. There were only four tractors in the whole of the Territory all of them being in

Sirmur District. The number of oil engines was only six, three each in Bilaspur and Sirmur Districts. A statement showing the use of agricultural machinery and implements in Himachal Pradesh in 1961 is given in Annexure I.

1.13.1. There is, however, a steady improvement in the use of both indigenous and improved ploughs during the past few years showing an increase of 5.8 per cent of wooden ploughs over 1956 census. The number of iron ploughs has risen from 59 in 1956 to 3,278 in 1961. A beginning has also recently been made to conduct research and field trials on the suitability of various hand tools and bullock drawn implements. The improved agricultural implements such as iron ploughs, bar harrows, paddy rotary weeders, chaff cutters, maize, cob, shellers, seed dressing drums, sprayers and dusters, hand tools, garden kits, etc., are being gradually introduced through demonstration and subsidised sale to the cultivators. Among these, chaff cutters and plant protection equipments are in good demand. The iron plough has not yet found favour with the cultivators in most of the areas partly because of low draft capacity of the bullocks and partly because of stony nature of the soil. Hand tools and garden implements stand much greater scope for introduction for vegetable cultivation and fruit gardening. In order to watch the progress of the introduction of improved implements and machinery, it is necessary that steps should be taken to enumerate systematically all categories of improved implements at the time of quinquennial livestock censuses.

1.14. Hand tools.—In Himachal Pradesh hand tools play a prominent role in farm economy. Most of these tools are, however, crude, primitive and inefficient. Accordingly, the Research, Testing and Training Centre, Mandi has taken up some work on their improvement. A few hand tools imported from West Germany *e.g.*, 3-tined cultivator, ridger and hoes have been copied and, in some cases, modified to suit local conditions. This is an effort in the right direction but the Team feels that, apart from such development work, it is necessary to carry out systematic research on the shape and size of the tools in relation to the physical capacity of the worker. The length of the handle, the dimensions of the blade and the angle of its attachment need special attention so as to enable the worker not only to perform the farm operations conveniently but also to give the maximum output of work.

1.15. Scope of small-scale mechanisation.—The two-wheeled walking tractor, popularly known as power tiller, being used in the Balh Valley of Mandi District under the Indo-German Agricultural Project, seems to have indicated potentialities of its introduction in the hilly areas. It was reported to the Team that these versatile machines are now in much demand by the local cultivators due to their small size, light weight, ease in handling and low initial cost. They are able to move freely in the small-sized fields separated by high bunds and perform most of the conventional farm operations such as ploughing, harrowing, intercultivation, puddling, etc. They can also be worked as a stationary unit for pumping water from the nearby streams to meet the irrigation requirements of the farm or for threshing and winnowing the harvested crop within the minimum time which is always a problem in the hilly areas due to moist weather conditions and hazards of inclement weather.

## CHAPTER II

### PROGRAMMES AND PROBLEMS

#### Research

2.1. There is no separate Agricultural Engineering Section in the Department of Agriculture, Himachal Pradesh. No serious efforts had been made, till recently, to evolve and design improved implements, suitable for the hilly areas, with the result that the age-old wooden plough and indigenous hand tools continue to dominate the tillage operations. The problem is, however, proposed to be tackled in the Research Testing and Training Centre, Mandi, which is also expected to look after the activities of the Engineering Section of the Department.

2.2. Research Testing and Training Centre, Bhangrotu (Mandi).—The Centre was started in the Third Plan Period as a centrally sponsored scheme under the Indian Council of Agricultural Research. The main objects of the scheme are:—

- (i) To evolve simple, low cost and easy-to-maintain implements and machines for reducing the cost of cultivation, relieving human drudgery and increasing agricultural production in the Territory;
- (ii) To test the most suitable implements to find out their suitability for Himachal Pradesh;
- (iii) To modify the implements to suit local conditions;
- (iv) To introduce and popularise the improved selected implements amongst the cultivators;
- (v) To impart training to the farmers, local blacksmiths and village level workers; and
- (vi) To import suitable low-cost manually as well as power-operated implements and machines to find out their suitability under local conditions.

2.2.1. The approved technical programme for the entire period of the scheme (1961—66) includes:—

- (i) Designing of
  - (a) Clod crusher
  - (b) Small plough
  - (c) Tool bar for fitting different implements
  - (d) Seed Drill
  - (e) Hand tools for interculture.
- (ii) Testing of
  - (a) Single-bullock harness
  - (b) Power tiller
  - (c) Power-driven implements.

- (iii) Imparting training to sons of farmers, local blacksmiths and village level workers.
- (iv) Popularisation of improved agricultural implements.

Of the above, items Nos. i(a), i(b), i(c), iii and iv were included in the programme for 1964-65. So far no work has been started on the designing of a suitable clod crusher.

2.2.2. Although the Centre was sanctioned in February, 1962, yet the research work remained at a standstill for two years for want of workshop equipment, construction of buildings and non-filling of the post of Research Engineer till March, 1964. The main workshop building is still under construction and the research work is being carried out in a temporary shed. The machinery and equipment for the workshop are to be supplied by the Government of the Federal Republic of Germany as aid programme under the Indo-German Agricultural Project, Mandi.

2.2.3. *Development of improved implements.*—With a view to developing most suitable improved agricultural implements for the use of the cultivators under varying agro-climatic conditions in Himachal Pradesh, the Centre has tried a number of hand tools and bullock-drawn implements, imported from West Germany under the Indo-German Agricultural Project, Mandi and some of them have been modified to suit local conditions. The progress, so far, made in this direction is given as under:—

(i) *Four-in-one Tool Bar.*—It is a simple device in which four implements *viz.*, mould board plough, harrow, cultivator and ridger can be fitted to a common frame. The tool bar is provided with a depth adjusting screw and the depth of an implement can be adjusted while it is in operation. A farmer needs to have only one tool bar for operating four implements one by one. Efforts are also being made to evolve a seed-cum-fertilizer drill suitable for this type of tool bar.

(ii) *Mould board plough.*—It is specially suited to small bullocks in the hilly areas and can be fitted to the tool bar. It can go as deep as seven inches and the maximum width of the cut is eight inches which can be adjusted according to the availability of the bullock power. One German two-handle mould board plough has also been modified to suit the medium type of bullocks and a trial order for the fabrication of 250 units has already been placed with the Nahar Foundry.

(iii) *Ridger.*—It is operated by a pair of weak bullocks and can be fitted to the tool bar.

(iv) *Cultivator.*—It is a three tined implement fitted to the tool bar and the tynes can be adjusted according to the need.

(v) *Harrows.*—Two types of harrows *viz.*, disc harrow and peg-tooth harrow have been designed which are simple in mechanism and are operated by a pair of normal bullocks.

(vi) *Hand tools.*—Seven different types of hand tools *viz.*, 3-tined hand cultivator, 3-pronged hand cultivator, plain hand hoe, hand ridger, hand rake, zig zag hand hoe and push-type hand hoe have been found suitable under the local conditions. The indigenous tools not only take more time in carrying out a particular operation but also create a lot

of physical strain in the loins, calf muscles, spine, etc., of the worker in a very little time due to their crude and out-moded design. With the improved tools, the farmer would be able to perform timely operations in much more area, thereby reducing the cost of cultivation.

(vii) Some of the other implements on which extensive field tests are in progress include Assam plough, Wahwah plough, single-bullock harness, winnowing fan, etc.

2.2.4. *Operational efficiency.*—The operational efficiency of the various implements designed and developed at the Centre is given in Annexure II. It will be seen that most of them have been developed to suit a common tool bar and the cultivator will be able to carry out different field operations more accurately and efficiently and well within the schedule of farming operations. The efficiency of hand tools is 3 to 8 times more than the indigenous *khurpa*, *phacra*, etc., depending upon the nature of field operations. Efforts have been made for their popularisation amongst the cultivators. The Centre sold more than 3,500 improved implements and hand tools on 50 per cent subsidy during 1964-65.

2.2.5. *Problems.*—The Centre is faced with certain urgent problems which require immediate attention; the most important among them being inadequacy of staff. The Research Engineer who is a State Level Officer for research and training is unable to look after the work in other districts as he is pre-occupied primarily with the research work at the Centre and also extension work in Mandi District. The Centre does not have full contingent of technical staff. In the Third Plan, there is a provision for one Assistant Engineer but he has not been appointed so far with the result that the entire workload is on the Research Engineer. Similarly, the post of a blacksmith is still lying vacant. Some of the posts like workshop foreman, welder and machine man, for which there is no provision, are considered essential for more efficient output at the Centre. There is also a great need to appoint 2-3 additional blacksmiths to undertake mass production of hand tools and bullock-drawn implements for large scale distribution to the cultivators at low cost. Although it is not strictly within the objectives of the Centre, and should not form a normal pattern of work, yet this arrangement is considered necessary for some time till the private implements manufacturing factories spring up in the District. The Research Engineer could utilize his time more effectively in technical matters if he is adequately provided with supporting staff.

2.2.6. At present the research work is being carried out in a temporary shed which is hardly satisfactory. However, the construction of the workshop building has since been completed and it is being fitted with the equipment received from West Germany. It is obvious that the full-fledged programme of work can be undertaken only when the workshop building is equipped with necessary tools and machinery.

2.2.7. There is an acute shortage of high carbon steel for the fabrication of fast-moving parts of implements, being designed or tried at the Centre. Even the mild steel has not, so far, been allotted to the Centre and it makes its purchases from the local market. It is, therefore,



necessary to assess the annual requirements of iron and steel and arrange for their timely supply to the Centre.

**2.3. Indo-German Agricultural Implements Workshop.**—Under an Agreement entered into with the Government of the Federal Republic of Germany by the Government of India in May, 1962, a large number of hand tools, bullock-drawn implements and power machines, as given in Annexure III, have been imported from West Germany for intensive use in the Indo-German Agricultural Project in the Mandi District. A German Expert on Agricultural Machinery is the overall incharge of the implements programme. He is assisted by a German Senior Mechanic. The Himachal Pradesh Administration has declared the Research Engineer, Research Testing and Training Centre, Bhangrotu (Mandi) as Indian counterpart to work in close collaboration with the German Expert. The main functions of the workshop are research, designing, fabrication of experimental implements and prototypes, service of heavier equipment of the farmers, and maintenance of vehicles and other imported equipment. It has also a well-equipped mobile workshop van attached to it which can be taken to any place connected with a motorable road for rendering servicing facilities to the cultivators on the spot. Some of the important implements and machines that have so far, been tested and found suitable under the local conditions are mentioned below:—

- (i) *Single-axle power tiller.*—The tiller is fitted with 9 h.p. air-cooled diesel engine and can operate mould board plough, rotovator, cultivator, cutter bar for harvesting, 2-inch delivery water pump, trailer, etc. Under the agro-climatic conditions of Mandi, the tiller has worked satisfactorily in the dry land but has not, so far, been tried under wet-land conditions.
- (ii) *General-purpose diesel tractor.*—This has been tried in Mandi District for ploughing, harrowing, seed-drilling, etc., and its operation has been found to be satisfactory.
- (iii) *Combine harvester.*—It has been tried for harvesting, threshing and winnowing jobs on the Government farm, Bhangrotu for two seasons and the performance is stated to be good.
- (iv) *Hand-operated scythe.*—This works well for cutting the fodder crops like berseem, lucerne, etc., in a standing position but cannot be used for cutting cereal crops because there is shedding of grains if the ears are dry.
- (v) *Hand-operated hoes and cultivators.*—The German plain hoe, zig-zag hoe and cultivator have proved successful for intercultural operations, especially in vegetable gardening.
- (vi) *Pruning knives.*—These have been sent to various places for testing the quality and working efficiency.

From amongst the imported machines and implements, single-axle power tillers, power knap-sack sprayers-cum-dusters, hand-operated garden seed drill and various types of hand tools are considered to be specially suited to small holdings under local conditions. Since Mandi District offers a pattern of mixed farming, with special emphasis on the development of fruit orchards and vegetable cultivation on commercial lines, there is a vast scope for the extensive use of hand tools for inter-culture and the knap-sack sprayers-cum-dusters for more effective control of insect pests and diseases.

2.4. **Trials with Agria Universal single-axle power tillers.**—Recently trials have been conducted with the German imported Agria Universal single-axle power tiller in Mandi District. The highlights of the tiller are:—

- (a) It has a 9 h.p. air-cooled diesel engine;
- (b) Its output is 2 acres of ploughing per day of 8 hours working;
- (c) The consumption of diesel is about one litre per hour;
- (d) Its speed in the second gear is 5 km., in the top gear 15 km., and in the reverse gear 5 km.;
- (e) It can be put to various uses like ploughing, roto-tilling, cultivating, harvesting, haulage and as a stationary power unit for pumping water, threshing, etc.

Although no scientific record of its field performance has been maintained, its demonstration, nevertheless, has aroused a good deal of interest amongst the local cultivators. It is understood that the Government of India are arranging to import a few more power tillers of this type from West Germany, under the aid programme, for distribution to the cultivators in Mandi District on no-profit no-loss basis. It is, however, necessary to conduct exhaustive field performance tests of this machine under local conditions before undertaking any large scale programme of its distribution amongst the cultivators.

### Education and Training

2.5. **Himachal Agricultural College, Solan.**—The Agricultural College in Himachal Pradesh was started in 1962. Thirty-five students are admitted to the First year class annually. Agricultural Engineering forms a part of the syllabus for B.Sc. (Agri.). In the First year, there is no separate paper in Agricultural Engineering but it forms a part of the Agronomy paper and deals with the objectives, sequence and effect of tillage such as ploughing, grubbing, clod crushing, levelling, harrowing, rolling, earthing up, etc., and their relation to agriculture. The practicals consist of assemblage, adjustments and working of simple tillage implements, both indigenous and improved. In the Second year, there is one full paper in Agricultural Engineering dealing with farm power and machinery (internal combustion engines with elementary idea of fuel, lubrication and oiling systems, horse-power and simple calculations; types of tractors and drawbar horse power calculations; pumps and pumping sets, etc.) farm electrification, farm structures and land surveying. The practical training comprises the study of fuel, lubrication and cooling systems of engines, transmission systems in tractors, battery charging, determination of drawbar horse power, finding discharge of wells and use of surveying instruments. The subjects taught in the Third year are irrigation, drainage, soil and water conservation. In the Final year, the subject of Farm Management includes equipment of farms; machinery and implements; tractor cultivation; power-driven threshers and other machinery; and utility and working out cost for various agricultural operations. The practicals aim at attaining proficiency in the use of implements.

2.5.1. Of ten Assistant Professors, one is for Agricultural Engineering and the other is for Agronomy. While the former teaches fundamentals of agricultural engineering, the latter imparts training in the

practical use and handling of implements and machinery. The Assistant Professors in all the subjects are assisted by Lecturers and are in position but the post of Lecturer in Agricultural Engineering has been lying vacant. It is, therefore, necessary to fill up this post without further delay so that the syllabus in Agricultural Engineering is fully and comprehensively covered. There is also an urgent need to appoint an experienced mechanic or operator for proper handling of various implements and machines.

2.5.2. There is only a small workshed with a few improved implements where the students come for practicals. This arrangement is hardly satisfactory. The Team feels that there should be a well-equipped agricultural workshop which should provide adequate teaching facilities and practical training to the students. This workshop could also be utilized for attending to normal repair work of furniture and laboratory equipment in various sections.

2.6. Gramsevak Training Centre, Mashobra.—A Workshop Wing for imparting one-year training to the village artisans was added to the Gramsevak Training Centre, Mashobra in 1958. The main objective of training is to equip the village carpenters and blacksmiths in the knowledge and art of making and repairing hand tools and agricultural implements. A total number of 59 artisans have been trained in five batches from 1958-59 to 1963-64. The training of village artisans has since been discontinued, as the post of Chief Instructor (Workshop Wing) has not been filled up for the last 3-4 years and the Instructor (Carpentry) and Instructor (Blacksmithy) are not considered to be well-qualified and competent to impart training of the requisite standard.

2.6.1. The Workshop Wing has, so far, restricted its activities to the manufacture and repair of hand tools only, for the obvious reason that they offer greater scope for adoption in the agro-horticultural economy of the Pradesh. The main items of fabrication are 3-tined hand hoe (Rs. 4.50) hand rake with 5 teeth and a grip (Rs. 4.00), Dutch hand hoe with 'V' shaped blade (Rs. 3.00), Naini hoe (Rs. 2.50) and American hoe (Rs. 5.00). The Centre has manufactured 246 hand tools, out of which nearly 200 have been distributed to the cultivators and village artisans. One of the remarkable achievements of the Centre is that it has developed a simple horticultural kit with a set of 38 tools and spanners for horticultural work, which seems to be very handy and useful for the orchadists.

2.6.2. *Problems.*—The following points came to the notice of the Team during its visit to the Workshop Wing and require immediate attention of the State Government:—

- (i) The training of village artisans is at a standstill because the requisite staff is not in position. Urgent action is needed to fill up the post of Chief Instructor because there is no other Workshop Wing in the whole of Himachal Pradesh for training the village artisans.
- (ii) There is no separate financial provision for a separate building for the workshop. It is necessary that the Workshop Wing should have its own full-fledged workshop building with ample working space and training facilities for the village artisans.

- (iii) The Ford Foundation' has provided a revolving fund of Rs. 12,500 for advancing loans at the rate of Rs. 500 per trainee, for providing him with suitable tools and equipment but, so far, no use of it has been made at the Centre.
- (iv) The village artisans do not have any facility of iron and steel for the manufacture and repair of implements and hand tools. They are also not supplied with prototypes for the manufacture of implements and tools, according to the standard specifications.

2.7. Government Cluster Centres.—During the First and Second Plan Periods, a number of training centres were established at various places in Himachal Pradesh to impart training in different trades. Some of the centres have served their utility and have since been dropped. The centres which did not fulfil their obligations have been combined together and established at a central place in the district in a cluster type institution where some more trade drafts have been added to them. Six such Cluster Centres, one in each of the following six districts, have been started under the Industries Department, Himachal Pradesh since August, 1964:—

(i) Rewalsar	(Mandi District)
(ii) Chowari	(Chamba District)
(iii) Bilaspur	(Bilaspur District)
(iv) Kalpa	(Kinnaur District)
(v) Theog	(Mahasu District)
(vi) Paonta	(Sirmur District)

2.7.1. These Centres are on the pattern of the Industrial Training Institutes but are meant specifically to cater to the rural needs in such crafts as millwrights, carpentry, blacksmithy, fruit and vegetable preservation, weaving and spinning, tailoring and embroidery, leather work, etc. Ten trainees are admitted in each trade every year and each trainee gets a stipend of Rs. 30 per month during the period of training. The facilities for training in carpentry exist at five Centres (except Paonta) and in blacksmithy at four Centres (except Theog and Bilaspur). The course of training is for 1½ years followed by six months' apprenticeship in a firm or a factory. In the blacksmithy course, there is a provision for making agricultural implements and the course for carpentry includes methods of setting out and making yoke, wooden pulley, plough, cart wheel, etc., but in actual practice there are no implements at the Centres for teaching purposes nor any training is imparted to the trainees in the manufacture and carpentry work of implements. The trainees after the completion of training in blacksmithy and carpentry generally do not go back to the villages to start their own work but, instead, seek employment with some firms or factories in the urban areas. Since the rural areas of Himachal are generally deprived of good village artisans and the Cluster Centres are primarily meant to cater to the rural needs, it is essential that the training in the manufacture and handling of common agricultural implements does not merely remain a paper scheme but is organised on sound basis. Adequate funds should also be placed at the disposal of these Centres for the purchase of complete sets of agricultural implements commonly in use in that particular locality.

2.8. **Industrial Training Institute, Solan.**—The Institute has a course in carpentry but the entire training programme revolves round wood work in building construction, household furniture making, joints and joining materials, varnishing and polishing, wood turning, etc., and practically nothing is taught in respect of making and setting of wooden parts of implements. The activities of these trainees will not always remain restricted to what they have been taught in the Institute but sometimes they may be required to handle the wooden parts of agricultural implements as a part of their profession. The Government may, therefore, consider the possibility of including at least the elementary knowledge of agricultural implements in the carpentry course.

### Iron and Steel

2.9. The basic and the most important item in the manufacture of implements is iron and steel. Since there are no private fabricators, the problem of arranging raw material and other facilities to them has not cropped up so far. However, there is a constant demand for G.C. and B.P. sheets for agricultural purposes such as construction of stores, cowsheds, poultry pens, etc. To meet the demand of the farmers, the procedure for procurement and allocation of iron and steel is, more or less, the same as is prevalent elsewhere in the country. The Apex Federation under the Cooperative Department is dealing with the iron and steel at the State level with the District Cooperative Federations at the district level. Under the proviso of the Iron and Steel Order, these Federations are registered as 'Registered Stockists' by the Iron and Steel Controller. In short, the allotments made by the Ministry of Food and Agriculture are allocated district-wise and the quantity allotted is lifted by those stockists by putting up indents to the Iron and Steel Controller who, in turn, places these indents on the producers concerned.

2.9.1. The Block Development Officer assesses the requirements of the cultivators, on *ad hoc* basis, through village panchayats and Gram-sevaks and forwards them to the District Agricultural Officer. The District Agricultural Officer consolidates the demand of all the Blocks in the district and forwards them to the Deputy Director of Agriculture (Extension) who, in turn, forwards the indents of the whole Territory to the Director of Agriculture. The Director of Agriculture arranges for the allotment of quota through the Ministry of Food and Agriculture and distributes it amongst the District Cooperative Federations on *pro rata* basis under intimation to the District Agricultural Officers. The District Agricultural Officers make the block-wise allocations and inform the Block Development Officers who issue permits to the cultivators to collect their quota from the District Cooperative Federations. These Federations make sales strictly in accordance with the prices fixed by the Iron and Steel Controller, Calcutta from time to time after adding the necessary incidental charges accruing thereon.

2.9.2. There is a general complaint that the iron and steel quota for agricultural purposes is not available within a reasonable time and generally it takes two years or more for its supply. A case study of allocation of quota in Chamba District indicated that there has been no supply of iron and steel in the district for the last 2-3 years. Even the indents placed by the District Cooperative Federation on the Producers in 1961-62 have not been honoured so far. The whole procedure, therefore, needs to be reviewed and cut short by long-term planning. In the absence of a satisfactory supply position, the petty artisans and farmers

are purchasing iron and steel for the manufacture of tools and small implements from the open market at exorbitant rates. No doubt, most of the items of iron have since been decontrolled, still it will be of considerable help and convenience if arrangements are made at the State level for the bulk purchase and its distribution amongst the cultivators and village artisans.

### Manufacture

2.10. There is no private manufacturer of agricultural implements in the whole of the Territory except that the State-owned Nahan Foundry Ltd., Nahan has been manufacturing various implements and tools such as iron ploughs, maize cob shellers, from time to time although the fabrication of cane-crushers is their main business. Lately, the Research Testing and Training Centre at Mandi has also undertaken the manufacture of hand tools in its own workshop as well as through the local artisans for distribution to the cultivators. In the absence of any well-organised manufacturing system, almost the entire demand for implements is met from outside Himachal, mainly from the neighbouring State of Punjab.

2.10.1. *Nahan Foundry.*—The factory is producing mainly cane-crushers, man-hole covers, electric motors and G.I. Pipe bends. It specialises particularly in the manufacture of different types of bullock-drawn cane-crushers e.g., Nawab, Sultan and Wazir and also power cane-crushers, the overall target for them being 6,500 during 1965-66. Of 6,500 cane-crushers, 4,000 are proposed to be sold on cash payment and the balance to be distributed to the cultivators under the hiring scheme. The total hiring business is nearly Rs. 14-15 lakh against an expenditure of about Rs. 10 lakh. The hiring charges per season vary from Rs. 80 to Rs. 125 according to the type of the cane-crusher. Before release, each piece is carefully tested for specifications, hardness, etc. The factory has got separate field staff which goes round and checks up the cane-crushers for performance and removal of defects, if any. Free servicing facilities also exist for power crushers.

2.10.2. The Foundry previously used to manufacture agricultural implements like Nahan plough, maize cob sheller, etc., but their production has since been stopped. However, the manufacture of implements is taken up as and when a firm order is placed on them. In 1964-65, the factory supplied 200 'Bhangrotu' ploughs to the Indo-German Agricultural Project, Mandi. Recently, they have another order in hand for the manufacture of 250 German double-handled iron ploughs but the work is held up for want of high carbon sheets and flats, the requirements for which are about three tons. The original cost of this plough was estimated at Rs. 128 per piece but is expected to be cut down to Rs. 50-60 with mass scale production.

2.10.3. The Foundry has been experiencing great difficulty in the procurement of good quality raw materials such as pig iron, lime stone and coke, the requirements of pig iron alone being around 4,000 tons annually. The Foundry has some testing and research facilities, but they are hardly adequate. There are also no separate funds for research purposes.

2.11. Mass production of improved implements and spare parts.—Despite considerable facilities available at the Nahan Foundry for the

manufacture of improved implements, almost all of them are purchased from the plains, mostly from Punjab, for sale to the farmers. This involves heavy cost of transport, handling, packing and forwarding. It will, therefore, be advantageous if the bulk production of improved implements of standard design and quality is taken up at the Nahani Foundry at a reasonably low price in consultation with the Deputy Director of Agriculture (Extension) and the Research Testing and Training Centre, Mandi. Another problem facing the cultivators is that the vital parts of implements such as tynes, blades, shares, etc., wear out very quickly in the stony soils and there is a great difficulty of replacing them. Even if the spare parts are available, they are of very poor quality and the cultivator has to incur expenditure frequently on their replacement, with the result that he gives up the use of improved implements and reverts to his trusted *desi* plough. In order to overcome these difficulties, there is a great need to start the production of vital parts of approved agricultural implements at the Government owned factory at Nahani. These parts should bear the hall mark of the Government and conform to the standard design and specifications so that they can be easily fitted into the implements fabricated by the Foundry.

**2.12. Rural Common Facility Workshops.**—Common Facility Workshops, one in each of the six districts, have been established under the Industries Department during the Third Plan, where common facilities for processing various types of raw materials and modern techniques of production are extended to the village artisans. The Workshop at Jogindernagar has recently taken up the production of hand tools (rakes and hoes) for supply to the Indo-German Agricultural Project, Mandi. As there are no private manufacturers of agricultural implements in Himachal Pradesh, it is necessary that these workshops are encouraged to take up mass production of hand tools under the technical guidance of the Research Engineer, Mandi for supply to the Departments of Agriculture and Development.

**2.13. Himachal Industrial Co-operative Society Ltd., Jogindernagar.**—The Society has offered to take up the manufacture of agricultural implements provided the Government places a firm demand on them. The response from the Agriculture Department is not encouraging, probably because the improved implements are still in the initial process of introduction and the Department is not able to assess their requirements. Secondly, better manufacturing facilities are available at the Nahani Foundry. In any case, the interest shown by the Society is commendable and needs encouragement from the State Government.

**2.14. Establishment of a Power Tiller Factory.**—The Government of Himachal Pradesh propose to set up a small tractor (power tiller) factory in the public sector during the Fourth Five Year Plan in collaboration with the Government of the Federal Republic of Germany. The proposal is still in the initial stages and details are being worked out in consultation with the German Experts.

#### Sale and Distribution

**2.15.** There is no private agency engaged in the distribution of agricultural implements in the Territory and this programme is being looked after by the staff of the Agriculture Department as a part of their normal

work. A classified list of improved implements approved by the Department of Agriculture is given in Annexure IV. All the implements, including plant protection equipment, are eligible for 50 per cent subsidy. The transport charges from factory to the headquarters of the District Agricultural Officer or Block Development Officer are included in the cost of the implements for assessing 50 per cent subsidy.

2.15.1. The procedure for the sale of implements is that the District Agricultural Officer maintains the loan and subsidy account separately. The Block Development Officer collects applications for different tools and implements from the cultivators and forwards the requirements to the Block to the District Agricultural Officer. He consolidates the demand for the whole district and places indents with the manufacturers after getting their quotations. The entire cost is met from the loan head at the time of purchase. On receipt, the implements are distributed among the Block Development Officers who sell them to the cultivators at 50 per cent subsidy and the remaining 50 per cent is recovered from them as short-term loan. The Block Development Officer maintains a register of subsidised implements and the receipt of the purchaser is pasted thereon. The amount realised is credited to the treasury and copy of the challan is sent to the District Agricultural Officer for record. The amount spent from the loan head is recoverable within 18 months, otherwise it is liable to interest. As such, the efforts of the Block Development Officer are always to sell the implements within the specified period. The District Agricultural Officer also gets money from the Social Welfare Department for the welfare of the Scheduled Castes under which implements are sold to them at 75 per cent subsidy.

2.15.2. The target for distribution of various implements during the Third Plan is 2,500 for the State except Mandi District. The proposal for the Fourth Five Year Plan is 10,000 implements, out of which 5,000 stand for Mandi District alone. The year-wise target and achievement in the Third Plan and the programme for the Fourth Plan are given as under:

Year	Target	Achievements
<i>Third Plan Period—</i>		
1961-62 . . . . .	500 Nos.	1,112 Nos.
1962-63 . . . . .	500 Nos.	No distribution due to non finalisation of subsidy rules.
1963-64 . . . . .	500 Nos.	797 Nos.
1964-65 . . . . .	500 Nos.	Not compiled.
1965-66 . . . . .	500 Nos.	
<i>Fourth Plan Period—</i>		
1966-67 . . . . .	2,000 Nos.	Including 1,000 for I.A.D.P., Mandi).
1967-68 . . . . .	Do.	
1968-69 . . . . .	Do.	
1969-70 . . . . .	Do.	
1970-71 . . . . .	Do.	



The following statement shows the break-up details of the various improved implements proposed to be distributed in Himachal Pradesh during the Third Plan (except Mandi District):

Sl. No.	Name of implements	Total
1.	Kisan ploughs . . . . .	467
2.	Bar harrows . . . . .	189
3.	Fodder cutters . . . . .	234
4.	Horticultural sets . . . . .	1,200
5.	Singh patellas . . . . .	16
6.	Paddy threshers . . . . .	12
7.	Maize cob shellers . . . . .	10
8.	Garden rakes . . . . .	60
9.	Foresters shears . . . . .	30
10.	Triphalies . . . . .	17
11.	Meston ploughs . . . . .	81
12.	Hindustan ploughs . . . . .	25
13.	Dibblers . . . . .	30
14.	Transplanting trowls . . . . .	30
15.	Watering cans . . . . .	20
16.	Combined hoes and rakes . . . . .	30
	<b>TOTAL . . . . .</b>	<b>2,451</b>
		or say <b>2,500</b>

2.15.3. A case study conducted at Chamba showed that nearly 350 garden tools and 10 Maruti foot sprayers were sold at 50 per cent subsidy in the District during 1963-64. There is thus more scope for the sale and distribution of garden tools in the district than the tillage implements which have a limited scope in this tract due to difficult terrain and small holdings. The low purchasing power of the cultivators is another factor coming in the way of the sale of costly implements.

### Extension and Popularisation

2.16. The Deputy Director of Agriculture (Extension) at the State level is the overall incharge of the extension and popularisation of implements in the Pradesh (except Mandi District) and at the District level, the District Agricultural Officer is incharge of the programme. In Mandi District, which enjoys special status due to the implementation of Intensive Agricultural District Programme, the Research Engineer, Research Testing and Training Centre is incharge of manufacture, sale, demonstration and extension of implements. The District Agricultural Officer, Mandi unlike other districts, is not handling this work in the district. At present there is no organised and well planned programme of the extension and popularisation of improved implements except Mandi District, although a beginning on a modest scale has been made in this direction. A few on-the-spot case studies conducted on the extension and popularisation of implements in Himachal Pradesh are given in Annexure V. The main conclusions drawn therefrom are that:

- (i) Unlike bullock-drawn implements, hand tools designed by the Research Testing and Training Centre, Mandi are becoming

quite popular with the cultivators, especially with those who have taken to vegetable cultivation, due to their cheapness combined with high working efficiency.

- (ii) No proper planning is done by most of the District staff with regard to the competitive prices of implements before actual purchases are made, with the result that they remain unsold, thus causing a serious impediment in the extension programme.
- (iii) Meston ploughs in some areas are not finding sale amongst the cultivators. The general consensus of opinion is that they are too heavy for the small-sized bullocks and also unsuitable for the stony soils.
- (iv) Rotary weeders in Jogindernagar Block have been sold to the cultivators without having due regard to their actual needs and utility for paddy crop as very little crop is transplanted in lines. Even the quality of iron used in them is of very inferior quality and cannot work properly in the demonstration plots. This type of haphazard selection of implements nullifies the very objective of the extension programme.
- (v) There is no proper maintenance of implements meant for demonstration purposes and once they are out of order, no efforts seem to be made to get them repaired and serviceable.

The main reason for the set-back of this programme is that there was no regular scheme for the propagation of improved implements in Himachal Pradesh in the First and Second Five Year Plans under the Agriculture Department. However, during the Second Plan Period, some improved implements were supplied to the cultivators by the Development Department.

2.16.1. Prior to the introduction of Five Year Plans, no serious work for the improvement of agricultural implements suitable for conditions in the hills had been carried out. The poor bullock power and the terraced nature of small fields present considerable difficulties in the utilization of improved types of implements. A scheme was, therefore, drawn up in the First Plan Period for the survey and study of the local types of agricultural implements, with a view to devising such implements as would be useful in the hilly areas. The main objects of the scheme were:

- (i) To survey and study different types of agricultural implements in use in Himachal Pradesh and to determine their utility and standard of efficiency;
- (ii) To effect improvements in the local types of implements with a view to increasing their efficiency;
- (iii) To devise new and more useful implements necessary for various agricultural operations and to standardise them with a view to facilitating their production on a factory scale; and
- (iv) To devise such mechanical devices as could be useful in every day agricultural work e.g., inventing suitable wheel barrows for carrying manure, etc., and finding out simple devices for lifting water and threshing grains.

Against a provision of Rs. 18,000, only Rs. 8,000 were spent on this scheme.

2.16.2. A scheme for the "Survey, Manufacture and Distribution of Improved Implements" was included in the Second Five Year Plan Draft of Himachal Pradesh. The scheme envisaged the purchase of 13,400 implements such as Meston and Hindustan ploughs, bar harrows and fodder cutters at a total cost of Rs. 3,96,840 (including subsidy and short-term loan) for a period of five years from 1956-57 to 1960-61 and their distribution to the farmers at 25 per cent subsidy and a short-term loan for the rest of the cost, but this scheme was ultimately dropped in the Revised Second Five Year Plan. The programme for the extension and popularisation of implements came into operation only in the Third Plan Period.

2.17. Scheme for "Demonstration and Popularisation of Improved Implements".—As already stated, it is a new scheme started only in the Third Five Year Plan and entails distribution of 2,500 improved agricultural implements to the cultivators on 50 per cent subsidy and the remaining 50 per cent to be recovered in the form of short-term loan. The subsidy is restricted to the implements costing upto Rs. 50 only for each item. The total Third Plan provision for the scheme (1961—66) is Rs. 50,000 by way of subsidy and an equal amount as short-term loan. The budget provision for the scheme is Rs. 17,000 for 1965-66 against Rs. 15,000 in 1964-65 and Rs. 10,000 in 1963-64. The scheme is proposed to be continued in the Fourth Plan, for which an outlay of Rs. 3 lakh for subsidy and another Rs. 3 lakh for short-term loan has been made in the Fourth Plan Proposals.

2.18. Scheme for "Popularisation and Demonstration of Improved Agricultural Implements" in Mandi District.—This is a special scheme of its own type in the country introduced for the first time in the Indo-German Agricultural Project, Mandi in 1964-65 as a part of intensive agricultural development programme in the District. The main objectives of the scheme are:

- (i) To create a widespread consciousness among the farmers of the District to reduce costs of agricultural production by use of efficient farm tools, implements and machines;
- (ii) To ensure that selected progressive farmers will start using at least some of the improved implements; and
- (iii) To ensure that selected progressive farmers with holdings of 5 acres and above, or those with lands provided with facilities like irrigation, will take to the intensive use of improved implements.

2.18.1. The salient features of the programme are:

- (i) Coverage of about 40 per cent or 20,000 agricultural families in the District in the use of at least some of the improved implements, as set forth in Annexure VI, costing not more than Rs. 50 per family. Other 5,000 families of progressive farmers will be induced to take up intensive use of improved implements at a cost of Rs. 250 per family. The implements will be sold to the cultivators on 50 per cent subsidy and the balance will be recovered from them in the form of short-term loan.

- (ii) Field trials of a number of implements to determine their suitability for introduction in the District. A preliminary list of these implements is given in Annexure VII. In addition, it is proposed to undertake field trials of improved hand tools and implements imported from West Germany so that their fabrication in the country could be considered.
- (iii) For effective popularisation of improved implements, five peripatetic teams comprising one Farm Mechanic (Grade I) assisted by one Farm Mechanic (Grade II) will be organised to cover all the Blocks in the District. Each team will be given a set of selected improved implements for trial programme and also a set of tools box for the repair and maintenance of implements of the farmers on the spot.
- (iv) Each village level worker will be provided with two sets of implements out of which one set will be given to the farmers on loan for demonstration on their own fields.
- (v) Transport would be provided from the pool of jeeps wherever available. In inaccessible areas, the peripatetic teams will be given pack mules with mule attendants to carry the implements to the destination. There is also a provision for the construction of temporary sheds for pack mules.
- (vi) Supply of a set of tools and equipment worth Rs. 200 to each trained artisan to assist him in setting up his workshop. For additional requirements, loans will be available from the Co-operatives in the District.
- (vii) Training of 160 artisans—20 artisans to be trained in one batch for a period of one month at a time and about four such batches will be organised per year over a period of two years. A stipend of Rs. 50 per month will be given to each trainee during the period of training.
- (viii) Training of village level workers in the handling of tools and demonstrations—20 gramsevaks will be trained in one batch for a period of 15 days at a time and the training of the entire contingent of 180 gramsevaks will be completed in nine batches during the first year.
- (ix) Adequate provision of loans to the trained village artisans by the Co-operatives for expanding and setting up village workshops and also for stocking agricultural implements, etc. Funds for this purpose will be provided by the Co-operative Banking Agencies with assistance, if any, from the Reserve Bank of India on the lines being followed for financing other intensive programmes in the District.
- (x) Most of the implements recommended under the programme are being manufactured by the reputed firms outside Himachal Pradesh. However, the manufacture of hand tools not normally offered for sale by them, or those evolved as a result of field research, or from amongst those imported from West Germany, will be required to be organised. For this purpose, the local workshops will be encouraged to undertake their manufacture or the co-operatives of the local artisans will be organised to undertake production.

- (xi) Marketing of the improved implements will be organised through the co-operatives and will be purchased by them on consignment basis. Government's investment will thus be necessary for purchasing and stocking of implements on consignment basis till their sale to the farmers against loans. This would be a short-term investment necessitating the creation of a rotating fund or alternately, the financial procedure presently being followed for the supply of fertilizers, etc. on consignment basis will be adopted in the case of implements also.
- (xii) The Agricultural Implements Workshop presented by the West German Government will be the nucleus of the entire implements programme in the District. The mobile workshop already existing in the District will be utilized for making advance workshop facilities near the farmers' fields in large areas.

Against a budget provision of Rs. 310,000 under the scheme during 1964-65, the actual expenditure incurred was only Rs. 47,500 probably due to organisational difficulties and late start of the scheme. The budget provision for 1965-66 is Rs. 316,000.

**2.19. Distribution of plant protection equipment.**—Plant protection equipment such as spraying and dusting machines are sold to the needy cultivators at subsidised rates to the extent of 50 per cent of the cost. The cost of internal transport is included in the total cost of plant protection equipment for the purpose of assessing 50 per cent subsidy on them. A sum of Rs. 25,000 has been provided in the budget provision during 1965-66 to meet the cost of subsidy on the sale of spraying and dusting equipment.

**2.20. Scheme for distribution of improved implements and appliances for Gur and Khandsari Industry.**—This is a scheme under the Khadi and Village Industries for the promotion of *gur* and *khandsari* industry in Himachal Pradesh for which a provision of Rs. 75,000 has been made in the Third Five Year Plan. The Territory has some areas where sugarcane is grown and *gur* and *khandsari* are manufactured. Its cultivation is concentrated in Balh Valley of Mandi District, Ghumarwin Tehsil of Bilaspur District, Solan Tehsil of Mahasu District and Paonta Valley of Sirmur District. The bullock-drawn cane crushers and traditional implements are widely used in all these areas. The crude and primitive methods employed to produce *gur* and *khandsari* fetch a low price in the market. The need for development of this industry is widely recognised and as such provision has been made for the introduction of improved implements and appliances to be distributed to the growers on subsidised rates.

**2.21. Role of Cooperative Societies in extension.**—The Project authorities in Mandi District have embarked upon the programme of the sale of improved agricultural implements through the cooperative societies. To start with, arrangements have been made with the Durga Service Cooperative Society, Ltd., Bhangrotu for the distribution of implements such as iron ploughs, peg-tooth harrows, hand tools, etc., to the cultivators at 50 per cent subsidy. All the prices are ex-factory and the transport upto the society is done, free of cost, by the Project vehicle. Loading and unloading charges are met out of contingencies. Thus every possible effort is made by the Agriculture Department to keep the

The provision for agriculturue is to be spent, among others, on the demonstration and popularisation of improved agricultural implements including sprayers and dusters subject to a maximum of Rs. 5,000 per annum. Subsidy is also granted for the popularisation of selected agricultural implements including plant protection equipment from the provision for agriculture in the block budget. At present, three Government Agencies are offering subsidy on the distribution of implements as under:—

- |   |  |
|---|--|
| (i) Agriculture Department . . . . .      | 50 per cent subsidy and 50 per cent short term loan.   |
| (ii) Development Department . . . . .     | 50 per cent subsidy.                                   |
| (iii) Social Welfare Department . . . . . | 5 per cent subsidy restricted to schedule castes only. |

2.27. Under the scheme on "Demonstration and Popularisation of Improved Implements" in the Third Five Year Plan, there is a provision of Rs. 50,000 as subsidy and Rs. 50,000 as short-term loan but actually no short-term loan\* has been given to the cultivators since the beginning of the scheme in 1961-62. It is necessary that the causes for the non-issue of loans should be looked into and removed in order to avoid hardship to the cultivators.

2.27.2. The progressive cooperative societies are handling production requisites such as seeds and fertilizers for supply to their members on loan but there is no such provision for agricultural implements with the exception of one or two solitary instances. A loan of Rs. 7,198 was advanced to the cultivators for the purchase of improved implements in 1959-60 which dwindled down to only Rs. 1,875 in 1960-61 and Rs. 2,570 in 1961-62. It is, therefore, necessary that the cooperative societies should be encouraged to stock implements and adequate funds placed at their disposal for issuing loans to the cultivators for the purchase of implements at a uniform nominal rate. To start with, only hand tools may be stocked and supplied on loan which are comparatively in great demand and gradually extended to bullock-drawn implements as and when demand for them is built up.

## CHAPTER III

### PERSPECTIVE PLANNING

3.1. Present Set-up.—The Director of Agriculture is overall incharge of the research, manufacture, distribution and popularisation of agricultural implements in the Territory. The Research Engineer, Research Testing and Training Centre, Mandi is directly under the control of the Director of Agriculture. On the extension side, the Deputy Director of Agriculture (Extension) is incharge of the programme at the State level and exercises control on the District Agricultural Officers and the Agricultural Inspectors working in the Blocks. At the District level, the District Agricultural Officer (except Mandi District) and at the Block level, the Agricultural Inspector are incharge of the implements programme. The Agricultural Inspector, one in each Block, works under the executive control of the Block Development Officer but is under the administrative and technical control of the District Agricultural Officer. In Mandi District, however, the Research Engineer, Research Testing and Training Centre is responsible also for the programme of extension and distribution of implements and the District Agricultural Officer is absolved of this responsibility.

3.1.1. In the plant protection organisation, there is a Plant Protection Officer at the headquarters under the Deputy Director of Agriculture (Extension) and is assisted by a Senior Plant Protection Assistant, a Junior Plant Protection Assistant and two mechanics. At the district level, there is a Plant Protection Assistant under the District Agricultural Officer and also an Assistant Sub-Inspector in some places for the distribution of insecticides and plant protection equipment at 50 per cent subsidy. There is no separate staff for plant protection work at the block level.

3.1.2. The soil conservation section is manned by the Deputy Director of Agriculture (Soil Conservation) and assisted by one Assistant Soil Conservation Officer (Engineering), one Overseer and one Assistant Draftsman at the headquarters. In addition, there are one Soil Conservation Officer, 7 Assistant Soil Conservation Officers, 19 Agricultural Inspectors, 2 Overseers, 5 Assistant Draftsmen and 11 Surveyors working in four Districts of Mandi, Bilaspur, Mahasu and Sirmur formed on the basis of watershed. The organisation has got 9 tractors with angle dozer, all working under the package programme in Mandi District.

3.1.3. With regard to the participation of the Development Department, Development Commissioner is incharge of the Community Development programme in the Territory. He is assisted by Deputy Development Commissioner at the Headquarters and all the Block Development Officers are under his control. The Gramsevak, though under the administrative control of the Block Development Officer, works under the technical guidance of the Agricultural Inspector in so far as the agricultural development work, including the extension and popularisation of agricultural implements, is concerned.

3.1.4. There are seven registered stockists and one controlled stockholder of steel. Of these, six are cooperatives and the remaining two private parties. The iron and steel allotted for agricultural purposes is

generally procured through these registered stockists and is placed at the disposal of the Director of Agriculture for distribution. No cooperative institution is at present engaged in the manufacture of implements, except one at Jogindernagar which has shown interest in taking up large scale production of implements provided a firm order is placed on them. The activities of a few progressive cooperatives are, however, restricted to advancing loans only to the cultivators for the purchase of implements.

3.1.5. The Industries Department has no organised system of manufacturing implements. Since there is no private unit engaged in the manufacture of improved agricultural implements and hand tools, there is no special staff for the procurement, supply and distribution of iron and steel for the manufacture of agricultural implements nor is there any research organisation for designing and testing of implements under this Department. There is only one Government owned factory at Nahan which fabricates mainly cane-crushers and sometimes ploughs, maize cob shellers, scateurs, etc., for which the raw material is allotted to them directly by the Directorate General of Technical Development, Government of India. The Department is running Cluster Training Centres in which carpentry and blacksmithy are among the trades taught. Training in the making of agricultural implements is included in the course but actually no attention is paid to this aspect.

3.1.6. It will thus be seen that three Departments namely Agriculture, Development and Industries are mainly concerned with the promotion of agricultural implements programme in Himachal Pradesh. A chart showing the organisational set-up for the research, manufacture and extension of improved agricultural implements in the Territory is given in Annexure VIII.

3.2. Suggested pattern of the organisation and various Programmes.—The present position with regard to the organisation engaged in research, manufacture, distribution and popularisation of improved agricultural implements and the availability of educational and training facilities has been mentioned in the preceding chapter. The Team has reached the conclusion that, in general, the present programmes are weak and inadequate and require to be considerably toned up. Some of the more important suggestions which are considered to be essential to streamline the programme are summed up below for consideration and implementation by the State Government, with such modifications as are considered necessary to organise the entire agricultural implements programme on a sound basis.

3.3. Staffing pattern.—At present, there is no separate staff for the programme of intensive popularisation of agricultural implements at the State, District and Block levels and this work forms a part of the normal activities of the Department of Agriculture. The Deputy Director of Agriculture (Extension) is too busy with various agricultural development programmes to do full justice to the implements programme. It is, therefore, necessary that there should be a separate organisation at the State and District level to handle this programme more efficiently. It is suggested that there should be a whole-time Agricultural Engineer (Class I) at the State level and an Assistant Agricultural Engineer (Class II) at the district level in each of the five districts (except Mandi) who should be assisted by an Agricultural Engineering Supervisor and a Farm Mechanic. This is the minimum suggested staff for the present and the strength of



the Agricultural Engineering Supervisors and Farm Mechanics may be increased subsequently and stationed in Blocks, as and when necessary, with the increase in the quantum of work involved. No additional staff is required for Mandi District as it is already having a well-organised programme.

3.3.1. The Agricultural Engineer should be overall incharge of the selection, purchase, distribution and extension of improved implements and hand tools in the Territory. He should be responsible for the assessment and distribution of iron and steel for agricultural purposes. He should also ensure that whatever little implements and hand tools are manufactured in Himachal are according to the standard designs and specifications. He should make a critical review of the existing sets of implements meant for demonstration purposes and select only the best suited ones for various regions of the Territory. He will also be incharge of the repairs and maintenance of power sprayers and dusters and other plant protection equipment kept at the headquarters and the two mechanics in the Plant Protection Section will work under his technical guidance. He could also be entrusted with the responsibility of looking after other programmes such as minor irrigation, soil conservation and small works programmes like construction of godowns. The Assistant Agricultural Engineer at the District level will work in close collaboration with the District Agricultural Officer and will be incharge of the distribution and popularisation of implements. He will be responsible for organising demonstrations on improved agricultural implements on scientific lines and will also look after the maintenance and repairs of demonstration sets including the plant protection equipment. The creation of an independent Agricultural Engineering Section will involve an expenditure of Rs. 3.65 lakh in the Fourth Five Year Plan, the details of which are given in Annexure IX.

3.3.2. Due to difficult terrain, it may not be possible to cover the entire district at a stretch under the programme. To start with, only a few progressive Blocks should be selected for the intensive programme of implements and gradually extended to other areas as and when the work gains momentum and the demand for implements is built up.

3.3. As regards the staff for plant protection work, the Team feels that the present staff is entirely inadequate and requires strengthening. It is recommended that to start with, those districts where area under fruit crops and vegetables is substantial, should have a Plant Protection Assistant with supporting staff at the Block level.

3.4. Research.—The working of the Research Testing and Training Centre, Bhangrotu (Mandi) needs to be organised on a more systematic basis by way of staff, technical programmes and supply of raw material. Early steps should be taken to fill up the existing posts and for the creation of additional posts as outlined in para 2.2.5. No work has yet been started on designing a suitable clod crusher, though it was included in the technical programme for 1963-64. The cultivators continue to use a very crude and primitive device for breaking the big soil lumps which is very inefficient, laborious and time-consuming. The work on this project, therefore, requires prior attention of the Centre. Some of the German machines and implements like Agria single-axle power tiller, power knapsack sprayer-cum-duster, hand seed drill, etc., promise a good scope, still intensive research and exhaustive field trials are necessary on their economics, efficiency and suitability under the local

conditions, before they are recommended to the cultivators for large-scale adoption. Since the Centre is meant for the entire Territory, the scope of research and evolution of new implements or modification of existing ones should not be restricted to the needs of the Mandi District alone but the specific problems of other districts should also be taken into account. The Research Engineer has evolved iron plough and a set of hand tools. It is necessary that the blue prints and specifications of these implements and their section-wise iron and steel requirements should be prepared by him to ensure standard design and quality by the local artisans. As regards the supply of raw material, the Centre is reported to be facing acute shortage of mild steel and high carbon steel for designing implements and is at present, meeting its demand from the local market. The total requirements of the Centre in this regard should be planned and supplies arranged by the State Government well in advance for more efficient working.

3.5. Education.—There are no adequate educational facilities in agricultural engineering available to the students at the Himachal Agricultural College, Solan. There is a need to set up a well-equipped Agricultural Engineering Workshop in the college for imparting fundamental knowledge of agricultural engineering to the college students and to afford them adequate facilities to familiarise themselves with the use and handling of various manually operated, bullock-drawn and power machines and implements. It is desirable that the workshop should also include a set of implements and hand tools recently designed by the Research Testing and Training Centre, Mandi. The Assistant Professor (Agricultural Engineering) should also remain in close touch with the latest developments made at the Centre.

3.6. Training.—The present training programme of village artisans at the Workshop Wing attached to the Gramsevak Training Centre, Mashobra is at a standstill. The problems, confronting the Centre in this regard are narrated in para 2.6.2. and should be immediately looked into. Immediate steps should be taken to make *ad hoc* arrangements for the training of village artisans pending the appointment of a Chief Instructor.

3.6.1. The present training of village artisans at the Workshop Wing is mostly restricted to the use, manufacture and repairs of various hand tools only. It is desirable that a complete set of improved bullock-drawn implements such as light iron ploughs, harrows, cultivators, chaffcutters, threshers, etc., suited to local conditions, are also included in the curriculum for imparting intensive training to the artisans. In view of the considerable scope of the expansion of the implements programme in the Territory, especially due to the impact of the Intensive Agricultural District Programme in the Mandi District, it is all the more necessary that the trained village artisans should have full acquaintance with the use, maintenance and repairs of all types of improved implements so that they are not faced with any difficulty at a later stage.

3.6.2. Each of the village artisans gets a stipend of Rs. 50 per month during the course of one-year training but there is no follow-up action to ensure that he returns to the village to take up the repair work of implements. Although an agreement is entered into with each trainee that the Government would recover the full amount of the stipend from him or his surety in case he leaves the Centre without the prior permission of the State Government or if he is dismissed for gross misconduct, negligence,

insubordination, etc., yet there is no provision in the agreement enjoining upon him to take up the repair and manufacturing work of agricultural implements in his home town or village for a certain minimum period after the completion of the training. It is, therefore, necessary to revise the agreement suitably.

3.6.3. The village artisan is generally not financially sound to set up the workshop with his own resources. At least Rs. 1,500 are required for the purchase of minimum tools such as hand drills, hammer sets, punch and chisel, die set, carpenter's tools, bits for hand tools, etc., to equip the workshop on a modest scale. A revolving fund of Rs. 12,500 provided by the Ford Foundation for advancing loans to the trained village artisans at the rate of Rs. 500 per head for equipping his workshop has not been utilized for the last 3-4 years due to certain technical implications. The Team feels that if the long-term loans are offered at a nominal rate of interest, the artisans might feel tempted to avail themselves of this facility. In case the response from them is still not encouraging, the State Government may consider the possibility of setting up small workshops at the Block level and rent them out to the village artisans at a nominal rate. One or the other arrangement is immediately called for as the repairing facilities of improved implements are almost non-existing in the rural areas.

3.7. Manufacture.—The demand for a number of improved agricultural implements; specially the horticultural hand tools, light iron ploughs and fodder cutters is steadily on the increase. Attention has, therefore, to be paid to the manufacture of these implements but, at present, there are no private fabricators of implements in the Territory. The Government Foundry at Nahan is the only concern which occasionally takes up the manufacture of tillage implements, in addition to its main business of sugarcane crushers. In the absence of any organised unit in the private sector, it is highly desirable that the Government Foundry should take up the mass production of all agricultural implements, approved by the Department of Agriculture, on a regular basis. Side by side, it should also take up the production of fast-moving spare parts. There is, therefore, an urgent need to chalk out a clear-cut policy of production and expansion programme. The policy is decided upon by a Board of Management on which there is no representative from the Department of Agriculture. It would be helpful if the Director of Agriculture, Himachal Pradesh is also associated with the Board of Management to render his expert advice on the manufacturing programme of implements. Further, before any implement is newly evolved or is intended to be taken up for mass production, the question of its suitability to local conditions or the scope of its popularisation amongst the cultivators has to be thoroughly examined. The Board of Management should, therefore, be assisted by an Advisory Committee on Implements which should include the Deputy Director of Agriculture (Extension), Himachal Pradesh as one of the Members.

3.7.1. A beginning may also be made to set up small fabrication units on cooperative basis, if possible, at suitable places, preferably, near the Common Facility Workshops in the districts. To start with, the fabrication programme can be taken up in Mandi District where the demand for implements is comparatively high and the cooperatives are functioning well and later extended to other important areas in the State.

3.8. Refresher Courses.—At present, there are no arrangements for imparting inservice training to the District Agricultural Officers, Block Development Officers and Agricultural Inspectors in the use and handling of various implements. It is necessary that short-term refresher courses for these categories of field workers may be arranged at the Research Testing and Training Centre, Mandi. A programme for training the village artisans in the maintenance and repairs of improved implements and the village level workers in the handling of tools has already been included under the scheme for Popularisation and Demonstration of Improved Agricultural Implements in Mandi District. It is, however, desirable that this programme should not be restricted to the boundaries of Mandi but should also be extended to the village artisans and gramsevak all over the Territory.

3.9. Extension and Popularisation.—The existing arrangements for the extension and popularisation of improved implements require to be considerably strengthened in order to have greater impact on the cultivators. There is an ample scope for bringing about improvement in the system of organising demonstrations on improved agricultural implements in the Territory. It is suggested that a concise programme indicating a definite number of demonstrations on the utility and advantages of improved implements should be determined for the whole Territory, splitting it further at District, Block and Village level season-wise and fixing the responsibility of each extension worker to achieve the target. It is also desirable to institute a system of awarding cash prizes or certificates of merit to the extension workers as an incentive to achieve the target in full.

3.9.1. At present the same set of demonstration implements has been given to each gramsevak irrespective of their utility and suitability to the local conditions. Since the soil and climatic conditions vary from place to place in Himachal, it is necessary that the Department of Agriculture should make a very careful selection of implements suited to different regions. The Department of Agriculture has prepared a list of the improved implements which have been approved by them. This is not sufficient. The implements should be further classified according to different agro-climatic conditions.

3.9.2. It is desirable that all the Government farms in the Territory should be equipped with necessary improved agricultural implements for large-scale use at the farms as well as to serve as demonstration to the cultivators.

3.9.3. One of the drawbacks in the improved agricultural implements programme is the difficulty, the farmer generally faces in servicing and replacement of simple parts. Many implements remain idle for want of nuts and bolts and replacement of worn out parts. This is a disadvantage in contrast to the local implements for which all parts can be made available by the village artisan himself from local resources. It is, therefore, necessary that the village artisans are supplied with adequate spare parts so that implements are repaired without causing any dislocation in the normal schedule of farm operations.

## SUMMARY OF RECOMMENDATIONS

1. In order to watch the progress of the introduction of improved implements and machinery, it is necessary that steps are taken to enumerate systematically all categories of improved implements at the time of quinquennial livestock censuses.

(1.13.1.)

2. The programme of general development of hand tools at the Research Testing and Training Centre, Mandi may also include systematic studies on their shape, size and angle of adjustment in relation to the physical capacity of the field worker.

(L.14.)

3. The working of the Research Testing and Training Centre, Mandi needs to be closely examined and streamlined with regard to the appointment of technical staff, equipment of workshop building and supply of raw materials.

(2.2.5., 2.2.6., 2.2.7.)

4. In the absence of any scientific data on the field performance of Agria Universal power tiller, any proposal for its large scale distribution amongst the cultivators is fraught with risk. It is, therefore, desirable to conduct exhaustive field trials with regard to its suitability, economics, efficiency, etc., before recommending it to the cultivators.

(2.4.)

5. Steps may be taken to expedite the appointment of a Lecturer in Agricultural Engineering at the Himachal Agricultural College, Solan so that the syllabus in Agricultural Engineering is fully and comprehensively covered.

(2.5.1.)

6. The horticultural kit developed by the Workshop Wing at Mashobra may be taken up for further trials at the Research, Testing and Training Centre, Mandi and if found suitable, should be encouraged for mass production.

(2.6.1.)

7. Immediate steps should be taken to restart the training of village artisans at the Workshop Wing, Mashobra. Urgent action is also needed to fill up the post of Chief Instructor in Implements.

(2.6.2.)

8. The Workshop Wing should have its own full-fledged workshop building with ample working space and training facilities for the village artisans.

(2.6.2.)

9. The revolving fund provided by the Ford Foundation and lying idle up-till now, may be utilised for advancing loans to the trained village artisans by simplifying the financial procedure.

(2.6.2.)

10. The training course in blacksmithy and carpentry at the Government Cluster Centres may be organised on sound basis so as to impart comprehensive practical training in the manufacture and handling of

common agricultural implements to the trainees. Adequate funds may also be made available to these Centres for the purchase of complete sets of implements commonly in use in that area for the benefit of the trainees.

(2.7.1.)

11. It would be desirable to include elementary knowledge of agricultural implements and hand tools in the carpentry course taught at the Industrial Training Institute, Solan.

(2.8.)

12. The lengthy and cumbersome procedure with regard to the supply of iron and steel to the cultivators needs to be reviewed critically and cut short by long-term planning. The Government may also consider the possibility of making bulk purchase of decontrolled items at the State level for distribution to the cultivators and village artisans at no-profit no-loss basis.

(2.9.2.)

13. The Government Foundry, Nahan may take up mass production of improved implements and fast-moving parts of standard design and specifications in consultation with the State Department of Agriculture.

(2.11.)

14. The Rural Common Facility Workshops should be encouraged to take up mass production of hand tools under the technical guidance of the Research Engineer, Mandi.

2.12.)

15. The system for the sale of improved implements through cooperative societies introduced in Mandi District should be extended to all well-established cooperative societies in the rest of Himachal Pradesh.

(2.21.)

16. A proper survey and assessment of specific types of implements, particularly in Chamba and Kinnaur Districts, needs to be conducted and only such implements as are really found suitable under the local conditions should be recommended to the cultivators.

(2.24.)

17. The possibility of inducing the Village Panchayats or big landlords to purchase old-fashioned threshers for hiring them out to the cultivators at nominal rate may be explored.

(2.24.)

18. There is a need to develop light but durable bullock-drawn implements like iron plough, triangular bar harrow, etc., specially suitable for the hilly terrain, small-sized fields and poor animal power.

(2.24.)

19. In view of vast scope of garden tools in Himachal, concerted efforts may be made to arrange their production locally rather than continue importing them indefinitely from outside the State.

(2.24.)

20. It would be useful to bring out simple leaflets on all important implements and hand tools giving their photographs, use, economics, price, method of handling, source of supply, etc., both for the farmers and extension workers.

(2.25.)

21. Audio-visual aids should be employed on a large scale to make the cultivators implement-minded.

(2.25.)

22. The programme of demonstrations on improved agricultural implements lacks sustained efforts and needs to be adequately strengthened. The demonstration sets should be kept in perfect working order and proper record of demonstrations maintained at all levels.

(2.26.1.)

23. The causes for the non-issue of loans to the cultivators for the purchase of improved implements need to be looked into and removed in order to avoid hardship to them.

(2.27.1.)

24. Adequate funds may be placed at the disposal of the cooperative societies for issuing loans to the cultivators at a uniform nominal rate for the purchase of agricultural implements.

(2.27.2.)

25. The State Government may examine the question of setting up a separate Agricultural Engineering Section for the demonstration and popularisation of improved agricultural implements more effectively and efficiently.

(3.3.)

26. The Research Testing and Training Centre, Mandi should pay prior attention to designing a suitable clod crusher.

(3.4.)

27. Intensive research and exhaustive field trials are necessary on the economics and efficiency of various German machines and implements before they are recommended to the cultivators for large-scale adoption.

(3.4.)

28. The blue prints and specifications of implements and hand tools evolved at the Research Testing and Training Centre and their section-wise iron and steel requirements may be prepared for the use of the fabricators.

(3.4.)

29. There is need to set up a well-equipped Agricultural Engineering Workshop at the Himachal Agricultural College, Solan for providing adequate teaching facilities and practical training in agricultural engineering to the students. The workshop may also include a set of implements and hand tools designed and developed at the Research Testing and Training Centre, Mandi.

(3.5.)

30. The Workshop Wing, Mashobra may include a complete set of improved bullock-drawn implements in the training course of village artisans to acquaint them with the use, maintenance and repairs of all types of improved implements in use in the Territory.

(3.6.1.)

31. Agreement entered into with the village artisans at the time of their training at the Workshop Wing may be modified making it compulsory for them to take up the repair and manufacturing of agricultural implements in their home village for a certain minimum period after the successful completion of the training.

(3.6.2.)

32. Long-term loans at low interest may be offered to the trained village artisans enabling them to equip their workshops with necessary tools and instruments.

(3.6.3.)

33. The State Government may consider the possibility of setting up small workshops at the Block level and rent them out to the experienced village artisans at nominal charges.

(3.6.3.)

34. The Director of Agriculture should be associated with the Board of Management of Nahar Foundry to render technical advice on the manufacturing programme of implements.

(3.7.)

35. Efforts may be made to set up small fabrication units for agricultural implements on cooperative basis at suitable places, preferably, near the Rural Common Facility Workshops.

(3.7.1.)

36. Short-term refresher courses in the use and maintenance of improved agricultural implements may be started for the District Agricultural Officers, Block Development Officers and Agricultural Inspectors at the Research Testing and Training Centre, Mandi.

(3.8.)

37. A concise programme indicating a definite number of demonstrations on improved implements may be determined for the whole Territory, splitting them further at district, block and village level season-wise and fixing the responsibility of each extension worker to achieve the target.

(3.9.)

38. It is desirable to institute a system of awarding cash prizes or certificates of merit to the extension workers, as an incentive, who achieve the annual target of demonstrations, in full.

(3.9.)

39. The Department of Agriculture may make a careful selection of improved implements to be included in the demonstration sets according to the local needs and agro-climatic conditions.

(3.9.1.)



40. All the Government farms may be equipped with only improved implements and machinery for increasing the efficiency of operations as well as to serve as model to the cultivators.

(3.9.2.)

41. Arrangements may be made to supply adequate number of spare parts of improved, agricultural implements to the trained village artisans so that implements are repaired without causing any dislocation in the normal schedule of farm operations.

(3.9.3.)

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## Terms of Reference of the Agricultural Team in relation to the study of Agricultural Implements

The Team will make an appraisal of the various schemes, both of the Central and State Governments, relating to Agricultural Implements and make such suggestions as it may consider necessary with a view to achieving economy, efficiency and expedition in the working of the schemes.

For the purpose of the study by the Team, Agricultural Implements will be divided into the following categories:—

- (a) Bullock-drawn implements;
- (b) Small power implements;
- (c) Hand tools and garden implements;
- (d) Irrigation appliances and machinery;
- (e) Plant protection equipment; and
- (f) Supplementary implements and equipment.

2. The Team will study, and report thereon, all aspects of the progress of various schemes, both of the Central and State Governments, and their efficiency and effectiveness in relation to the manufacture, popularisation and distribution of agricultural implements, particularly the following:—

- (i) *Research*
  - (a) Progress made in research at all levels at the Central and State Research Stations;
  - (b) Testing and trials, including the work done at Regional Testing-cum-Training Centres;
- (ii) *Manufacture*
  - (a) Availability of raw materials with special reference to the quality of iron and steel required for the manufacture of implements;
  - (b) Arrangements for quality control of implements;
  - (c) Adequacy of organisations, both public and private, in different States and the country as a whole, for the manufacture of improved implements;
- (iii) *Training*
  - (a) Study of training facilities in agricultural engineering, training standards; number of trainees, scope for their employment, etc.;
  - (b) Arrangements for training of village artisans and farmers;
  - (c) Follow-up in the field of the training programmes for artisans and farmers;
- (iv) *Sale and distribution*
  - (a) Review of the methods and organisations employed for the sale and distribution of implements and their effectiveness;

- (b) Role of the cooperatives and departmental seed stores in the distribution of agricultural implements;
- (c) Linking of credit facilities with the distribution of agricultural implements and grant of loans in kind;

(v) *Popularisation*

- (a) Review of the arrangement for demonstrations at the village and block levels, the methods and techniques adopted and need and scope for strengthening of the village and block level set-up;
- (b) Arrangements for repairs and maintenance at the various levels and the role and working of rural workshops;
- (c) Purchase and hiring of implements by Co-operatives and Panchayats;

(vi) *Administrative arrangement*

- (a) Need and scope for strengthening the Agricultural Engineering staff at the District, Regional and State levels;
- (b) Co-ordination among different agencies concerned with research, manufacture, popularisation and distribution of implements.

3. The Team will carry out case studies of the different prototypes of important Agricultural Implements and Hand Tools with a view to judging their efficiency, economy and contribution towards increased production. With a view to facilitating studies and making them realistic, the Team will consult and hold discussions with progressive farmers, manufacturers of agricultural implements and officers and staff of the State Agriculture and other concerned Departments, etc. The Team may co-opt representatives of various interests in the field of manufacture supply and use of agricultural implements in different States.

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## LIST OF ANNEXURES

- I. Agricultural machinery and implements in Himachal Pradesh.  
[Ref: para 1.13]
- II. Operational efficiency of bullock-drawn implements and hand tools developed at the Research Testing and Training Centre, Mandi.  
[Ref: para 2.24]
- III. Agricultural implements and farm machinery imported from West Germany for use in the Indo-German Agricultural Project, Mandi.  
[Ref: para 2.3]
- IV. A classified list of improved agricultural implements approved by the Department of Agriculture, Himachal Pradesh.  
[Ref: para 2.15]
- V. Case studies conducted on the extension and popularisation programme of agricultural implements in Himachal Pradesh.  
[Ref: para 2.16]
- VI. List of improved agricultural implements proposed to be distributed to 20,000 farmers in the Indo-German Agricultural Project, Mandi District and each farmer getting implements upto the value of Rs. 50 according to the need of his farm.  
[Ref: para 2.18.1 (i)]
- VII. List of implements proposed to be obtained for field trials to determine their suitability for introduction in Mandi District.  
[Ref: para 2.18.1 (ii)]
- VIII. Organisational set-up for the research, manufacture and extension of improved agricultural implements in Himachal Pradesh.  
[Ref: para 3.1.6]
- IX. Proposed set-up of the Agricultural Engineering Section for demonstration and popularisation of improved agricultural implements in the Fourth Plan in Himachal Pradesh.  
[Ref: para 3.3.1]
- X. Comments on the Report.

ANNEXURE I

[ Ref. Para 1.13 ]

*Agricultural machinery and implements in Himachal Pradesh (1961)*

District	Plough			Sugarcane crushers			Pumps for irrigation purposes			Per- sian Wheels	Tractors			Oil Ghanies				
	Wooden	Iron	Total	Carts	Power driven	Bullock drawn	Total	Worked by oil engines	Work- ed by electri- city		Total	Govt.	Pri- vate	Total	5 seers & more	Less than 5 seers	Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Bilaspur . . .		32,545	34	32,579	3	..	84	84	3	..	3	14	..	..	..	35	10	45
Chamba . . .		37,777	3,141	40,918	..	..	..	..	..	..	..	..	..	..	..	71	192	263
Mahasu . . .		65,593	19	65,612	..	..	17	17	..	..	..	..	..	..	..	39	85	124
Mandi . . .		61,718	31	61,749	4	21	24	45	..	..	..	..	..	..	..	51	82	133
Sirmur . . .		30,952	53	31,005	1,405	3	531	534	3	2	5	9	1	3	4	91	15	106
Kinnaur . . .		4,136	..	4,136	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	1961	232,721	3,278	235,999	1,412	24	656	680	6	2	8	23	1	3	4	287	384	671
	1956	219,873	59	219,932	1,318	4	502	506	6	2	8	N.A.	1	2	3	273	537	810

## ANNEXURE II

[Ref. Para 2.2.4]

*Operational efficiency of bullock implements and hand tools developed at the Research Testing and Training Centre, Mandi*

Sl.No.	Name of implement	Price (in Rs.)	Common uses	Output in one day (8 hours)	Remarks
1.	Mould board plough	60.00	Basic tillage implement for breaking the soil, also for turning in green manure crop.	0.9—1.25 acres.	Suitable for medium pair of bullocks, can be fitted to a common tool bar and the depth of the implement can be adjusted while it is in operation.
2.	Ridger	25.00	For making furrows and ridges for planting crops like sugarcane, potatoes, garlic, onions, etc.	1.75—2.5 acres.	It can be fitted to a common tool bar and is operated by a pair of weak bullocks.
3.	Cultivator	..	For intercultural operations of potatoes, maize, sugarcane, vegetables, etc., planted in lines, also for pulverising the soil to finer tilth.	1.75—2.5 acres.	A 3-tined implement and can be fitted to a common tool bar. Tynes are adjustable.
4.	Disc harrow	..	For breaking clods	1.75—2.00 acres.	It can be fitted to a common tool bar and is operated by a normal pair of bullocks.
5.	Peg-tooth harrow	..	For breaking the soil crust and secondary preparatory tillage operations, also for mixing fertilizers and broadcast cereal crops in the soil.	3.0—3.25 acres.	Simple in mechanism.
6.	3-tined hand cultivator	8.00	For weeding and hoeing all types of crops, basin making of fruit plants, primary cultivation under optimum soil and moisture conditions,	8 times more than <i>Khilna.</i>	Pull type with three curved rods with pointed conical soil engaging parts, no. of tynes required can be fitted separately.

Sl.No.	Name of the implement	Price (in Rs.)	Common uses	Output in one day (8 hours)	Remarks
7.	3-pronged hand cultivator	4.00	For intercultivation of nurseries or crops planted in lines, crust breaking of hard soil.	6-8 times more than <i>Khilna or Khurpi.</i>	Pull type fitted with a single unit of three small curved prongs pointed in the front.
8.	Plain hand hoe	6.00	For hoeing and weeding in vegetables and cereals grown in lines.	4-5 times more than <i>Khurpa.</i>	Pull type with one edged sharp plain blade.
9.	Hand ridger	8.00	For making ridges and furrows for underground crops like potatoes, garlic, onion, turnips, radish, etc., also for making small irrigation channels for crops sown in lines.	6 times more than spade for ridge making.	It resembles double mould board small plough with a long wooden handle.
10.	Hand rake	5.00	For breaking crust of seed sown soil, levelling the ploughed field, collecting the trash, stones, etc., from the land.	0.3—0.5 acre.	Pull type and quite simple in operation.
11.	Zig-zag hand hoe	6.00	For weeding and hoeing row crops, harvesting vegetables like spinach, cabbage, etc.	5 times more than <i>Khurpa.</i>	Pull type with soil engaged part having zig-zag constructional features.
12.	Push type hand hoe	4.00	Performs the work of a garden trowel for weeding and hoeing in light sandy soils	3 times more than <i>Khurpa</i> in light soils.	Push type and is operated by one man in erect position.

## ANNEXURE III

[Ref. Para 2.3]

*Agricultural implements and farm machinery imported from West Germany for use in the Indo-German Agricultural Project, Mandi.*

Sl. No.	Name of implement	No. imported	Total C.I.F. Val. (in Rupees)
1	2	3	4
1.	MATRA Mobile workshop van on Mercedes Benz Chassis fitted with electric lathe, electric drill, electric bench grinder, electric pedestal drill ( $\frac{1}{2}$ inch boring), electric welding set (300 amp.) 5-ton hydraulic press, sets of spanners, files, sockets, hammers, pliers, etc. All the equipment works on a prime-mover engine but the electric welding set has its own acetylene generator	One	100,000
2.	DEUTZ diesel tractor, 30-35 h.p. with 3-point linkage, front loading, crawling car, 3-power take-offs, action recorder, cutter bar, etc.	Two	36,000
3.	AGRIA Universal, single-axle power tiller, 5-8 h.p., diesel, with complete set of implements.	Ten	72,000
3-A.	Various attachments for AGRIA power tiller		2,050
4.	Sprinkler irrigation set for 12 hectares, complete with motor, pump and pipes.	One	24,000
5.	Sprinkler irrigation set with diesel engine, as above, for 2 hectares	One	12,000
6.	Tractor mounted irrigation pump	One	600
7.	Knapsack power sprayer-cum-duster with 1 h.p. engine	Twenty	14,400
8.	Seed cleaning-cum-treatment apparatus, capacity 1000 kg/hour	One	7,200
9.	Seed cleaning-cum-treatment apparatus, capacity 500 kg/hour	Two	7,200
10.	Seed cleaning-cum-treatment apparatus, Unimog-mounted and propelled	Two	7,200
10-A.	Spare: for seed cleaners & dressers.		2050
11.	Winnowers hand-operated	Ten	3,600
12.	Seed treatment drums hand-operated	Ten	1,200
13.	FAHR combine Harvester, Self-propelled with Mercedes Benz engine	One	18,000
13-A.	Spares for combine Harvester		1,450
14.	ISARIA Super Universal tractor-mounted seed drill	One	2,400
15.	Seed drill, animal-drawn	Two	1,960
16.	HANOMAG Caterpillar Tractor 60 h.p., diesel, with earth-moving equipment, scoop and rear chisel.	One	72,000
17.	One axis tractor, 10-12 h.p., diesel, with earth-moving equipment, plough and cultivator	One	9,800
18.	Diesel pumping sets with pipes	Five	24,000



1	2	3	4
19.	UNIMOG Mercedes Benz Tractor, Type HFL, 32 h.p. with rear power lift, with complete equipment and spare parts. . .	Two	58,800
20.	Tractor mounted implements		
	Disc plough . . . . .	One	2,400
	Two-bottom plough . . . . .	Two	1,200
	Cultivator . . . . .	Two	1,800
	Underwrist turn plough . . . . .	One	1,800
	Rotovator . . . . .	One	1,000
	Heavy harrow, 4 sections . . . . .	One	600
	Seed harrow, 4 sections . . . . .	One	360
21.	Bullock-drawn implements		
	Swing plough . . . . .	One	300
	One-bottom plough . . . . .	One	300
	Carriage plough . . . . .	One	360
	Zigzag harrow . . . . .	One	240
	Flexible harrow . . . . .	One	240
	Cultivator . . . . .	One	360
	Multipurpose implement for potato cultivation . . . . .	Two	1,140
22.	Hand seed drill with marker and other accessories especially suited for vegetable seeds . . . . .	Ten	2,500
23.	Hand seed drills for maize . . . . .	—	2,400
24.	Horticultural hand tools such as plain hoes, zigzag hoes, hand cultivators, hand rakes, etc. . . . .	—	9,600
25.	Fodder choppers . . . . .	—	11,000
26.	Hay-making machine . . . . .	One	2,100

## ANNEXURE IV

[Ref. Para 2.15]

*A classified list of improved agricultural implements approved by the Department of Agriculture, Himachal Pradesh.*

Name of implement	Approximate cost (in Rupees)
<b>1. Plough</b>	
(i) U.P. No. 2 . . . . .	84.00
(ii) Hill plough . . . . .	18.00
<b>2. Harrows</b>	
(i) Bar harrow . . . . .	45.00
(ii) Hill bar harrow . . . . .	35.00
<b>3. Cultivators</b>	
(i) Wahwah Junior . . . . .	72.00
(ii) Wahwah Senior with seeding arrangement . . . . .	86.00
<b>4. Levellers</b>	
Singh patella . . . . .	45.00
<b>5. Chaff cutters</b>	
Different standard makes . . . . .	75.00 to 125.00
<b>6. Seed drill</b>	
Wahwah . . . . .	587.00
<b>7. Threshers</b>	
Olpod thresher . . . . .	356.00
<b>8. Paddy weeders</b>	
Rotary paddy weeders of different makes . . . . .	20.00
<b>9. Horticultural tools</b>	
(i) Pruning scateurs . . . . .	15.00 to 45.00
(ii) Pruning knife . . . . .	6.00
(iii) Budding knife . . . . .	6.00
(iv) Grafting knife . . . . .	6.00
(v) Pruning saw . . . . .	9.00

## ANNEXURE V

[Ref. Para 2.16]

*Case studies conducted on the extension and popularisation programme of agricultural implements in Himachal Pradesh*

1. *Badyar Arca, Mandi Sadar Block.*—A discussion with the cultivators of Badyar area in Mandi Sadar Block revealed that no improved implements were used by them. This is the main hybrid maize production belt and the entire area under it has been sown with the tractors provided by the Project authorities. Sugarcane is another main crop but there are no improved implements for sugarcane cultivation. It is felt that a sugarcane ridger promises a good scope in this area. Paddy cultivation is mostly done broadcast on uplands but wherever it is planted in low lands, the line planting is not in vogue with the result that the paddy weeder is unknown in this area. Fodders are raised to an extent but no chaff cutter is available with the cultivators, though it is much in demand in the locality. Even there is no iron plough with any cultivator for primary tillage operations.

2. *Village Gutkar, Mandi Sadar Block.*—Unlike bullock-drawn implements, hand tools supplied by the Research, Testing and Training Centre, Mandi are becoming quite popular with the vegetable growers in Mandi Sadar Block due to their cheapness combined with high working efficiency. A set of 5 hand tools costs about Rs. 30 at 50 per cent subsidy and is within easy reach of even an average farmer. A visit paid to the village Gutkar in this Block which is extensively growing vegetables in about 20 acres showed great potentialities of the use of hand tools and these were found with most of the farmers engaged in vegetable cultivation.

3. *Sundernagar Block.*—The extension programme of implements in other Blocks in Mandi District on the whole appears to be poor. During 1962, the Block Development Officer, Sundernagar received a number of implements such as paddy weeders, Meston ploughs, Kisan hoes, corn dibblers, hand hoes and rakes, etc., from the District Agricultural Officer, Mandi for sale to the cultivators. A scrutiny of the stock register showed that none of them was sold upto October, 1964 as there was no demand for them. The Block Development Officer further received seven chaff-cutters from the same source out of which only one had been sold at 50 per cent subsidy. The chaff-cutters, though in demand, are not finding a ready sale due to high cost of Rs. 132 each received from Bombay. On the other hand, ten chaff-cutters were obtained by the Block Development Officer out of Block funds at Rs. 86.74 each and all of them have since been sold at subsidised rate. It is clear that no proper planning is done by the District staff with regard to the competitive prices of implements before actual purchases are made, with the result that high prices cause a serious impediment in the extension programme.

4. *Village Dhanote, Sundernagar Block.*—A visit to the village showed that out of 24 farm holdings in the village, none of them had got even one iron plough. The chaff-cutter was, however, much in demand in the locality.

5. *Jogindernagar Block.*—The position of extension programme in Jogindernagar Block is equally dismal. The Block Development Officer out of the Block budget purchased 17 rotary weeders from an Engineering firm in Jullunder. Out of these, 15 pieces had been given to the gram sevaks for demonstration purposes. The quality of iron used in the manufacture of these weeders was found to be extremely poor and the teeth on the rotary drum could be easily bent with hand. It is doubtful if such poor quality implements would produce any desirable effect on the cultivators and in fact their distribution is likely to impede the progress of the extension programme. Due care is, therefore, necessary in the proper selection of the implements before a mass order is placed on the firms. The mere low cost should not be the only criterion for the choice of implements. The Block Headquarters had also got Meston ploughs, 3-tine cultivator, maize cob sheller, etc., but these implements had been hardly put to any useful purpose and were lying in a dilapidated condition.

6. *Jitpur Circle, Jogindernagar Block.*—A discussion with the Gramsevak of Jitpur Circle showed that he has got a set of seed dressing drum, rotary duster, Maruti foot sprayer, maize cob sheller and chaff-cutter for demonstration purposes. All these implements are in use with the cultivators. This circle was started in 1963-64 and, so far, there are no improved implements, not even an iron plough, in use in this area. About 11 chaff-cutters have, however, been sold to the cultivators at 50 per cent subsidy.

7. *Jogindernagar Circle, Jogindernagar Block.*—The Gramsevak has a demonstration set comprising seed dressing drum, maize cob sheller, rotary duster, plunger duster, paddy weeder, sprayer, chaff-cutter, Meston plough, garden rake, scateur and pruning saw. The general concensus of opinion of the cultivators about the Meston plough is that it is too heavy for the small sized bullocks. The Gramsevak sold seven paddy weeders in his circle at 50 per cent subsidy but this implement was practically of no use as out of 700 acres under paddy in this Circle, only two acres were transplanted in lines. It is obvious that the implements are sold to the cultivators without having due regard to their actual needs and utility for a particular crop. This type of haphazard and unplanned extension is likely to result in failure rather than building up the programme on sound basis. There is also a complaint that the weeders are of inferior quality and cannot work properly even in the demonstration plots. A set of five hand tools, supplied by one of the German Experts on Agricultural Implements working in the Indo-German Agricultural Project, was sold to a cultivator for vegetable cultivation in 3.5 acres. These hand tools have been liked by the cultivators for interculture in vegetable cultivation and stand a good scope for popularisation on an extensive scale.

8. *Chowari Block, Chamba District.*—The extension programme in this Block does not seem to have been taken up in the right earnest. In the village Niharu, the cultivators use improved seeds and fertilizers but no improved implements. An iron plough was received by the Panchayat but was not found suitable due to stony nature of soil. There are no improved implements in this village. A demonstration on wheat was stated to have been laid out a couple of years ago but no improved implements were used. In another village Kariati in the same Block, although the entire area of 40 acres is served by irrigation, yet no improved implements are in vogue. In the third village Churhari, one of the cultivators got a chaff-cutter under the demonstration programme but never used it.

9. *Pachhad Block, Sarahan.*—The Block got 20 iron ploughs manufactured by the Nahar Foundary, out of which 16 have been distributed to the cultivators for demonstration purposes. The iron ploughs are getting a good response in this area. A visit to the Implements shed, however, showed that some of the demonstration implements such as chaff-cutters, maize cob shellers, iron ploughs, etc., were lying in a dilapidated condition and no effort seemed to have been made to get them repaired and put in a working order.

10. *Gram Panchayat, Bagla, Mandi Sadar Block.*—The Panchayat consists of 40 villages with about 700 farm holdings. Iron ploughs are very rare but chaff-cutters are owned by the *Gur and Khandsari* Inspector at 50 per cent subsidy through the Block Development Officer. In addition, the *Gur and Khandsari* Centre located at Luna Pani has set up its own cane crusher where farmers bring sugarcane for crushing and *gur* making on hire basis. Since there were private cane crushers in almost every village, there did not seem to be much scope for the Panchayat to set up community cane crushers for the benefit of the cultivators.

11. *Gram Panchayat, Manola, Chowari Block.*—It consists of about 1,000 farm holdings with a population of 2,600 persons. A discussion with the Panchayat Vice-President showed that only one or two iron ploughs were given to the cultivators for demonstration purposes but were not found suitable in the small-sized terraced fields. No other improved implements are available with the farmers.

## ANNEXURE VI

[Ref. Para 2.18.1 (i)]

*List of improved agricultural implements proposed to be distributed to 20,000 farmers in the Indo-German Agricultural Project, Mandi District and each farmer getting implements upto the value of Rs. 50/- according to the need of his farm*

Sl. No.	Name of the Implement	Approximate cost (in Rupees)
1.	Small size mould board plough . . . . .	16.00
2.	Small turnwrest plough . . . . .	50.00
3.	(i) Tool Bar cultivator attachment for mould board plough . . . . .	25.00
	(ii) Seeding attachment for tool bar . . . . .	12.00
	(iii) Adjustable ridger attachment . . . . .	29.00
	(iv) Sweep attachment . . . . .	20.00
	(v) Bakhar . . . . .	10.00
4.	Triangular peg harrow . . . . .	30.00
5.	Wheel hand hoe . . . . .	25.00
6.	Paddy rotary weeder . . . . .	20.00
7.	Budding and grafting knife . . . . .	6.00
8.	Pruning saw . . . . .	6.00
9.	Simple duster . . . . .	10.00
10.	Sprayer . . . . .	90.00
		(Rs. 40.00 to 90.00)
11.	Hand Maize sheller fixed on Wooden board 12" × 12" × 1" . . . . .	35.00
12.	Maize hand-dibbler . . . . .	16.00

## ANNEXURE VII

[Ref. Para 2.18.1 (ii)]

*List of the implements proposed to be obtained for field trials to determine their suitability for introduction in Mandi District.*

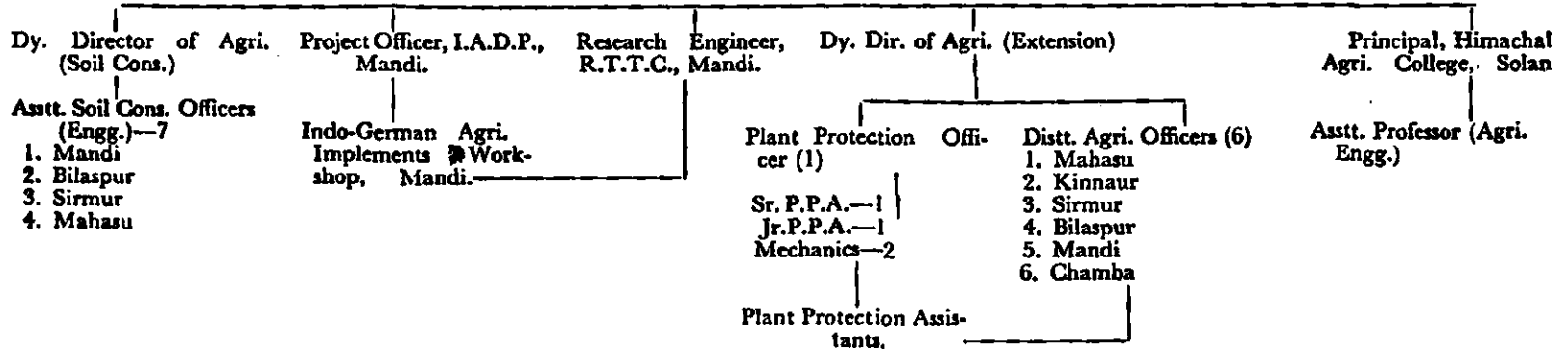
Sl. No.	Name of the Implement	Approximate cost (in Rupees)
1.	Assam plough	25.00
2.	Sharma hand hoe	3.00
3.	Care Junior plough	50.00
4.	Clod crusher	350.00
5.	Olpod thresher (11 discs)	250.00
6.	Disc harrow (4 discs)	200.00
7.	Wah wah plough and ridger	100.00
8.	Potato hoe with ridger	10.00
9.	Steel bakhar set with puddling attachment	80.00
10.	Puddler	60.00
11.	Bund former	55.00
12.	Deshmukh wheel barrow	40.00
13.	Hand seed drill for vegetables	90.00
14.	Rotary duster & sprayer	320.00
15.	Singh patela (4 feet)	40.00
16.	Singh patela (6 feet)	60.00
17.	Irani phawada	5.00
18.	Set of garden tools	20.00
19.	Plant lifter for nurseries	20.00
20.	Serrated sickle (Punjab type)	2.00

## ANNEXURE VIII

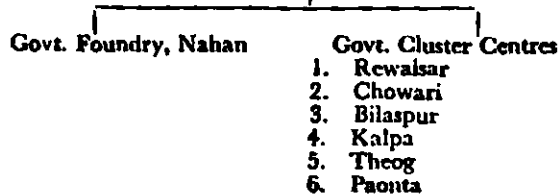
[Ref. Para 3.1.6]

*Organisational set-up for the research, manufacture and extension of improved agricultural implements in Himachal Pradesh*

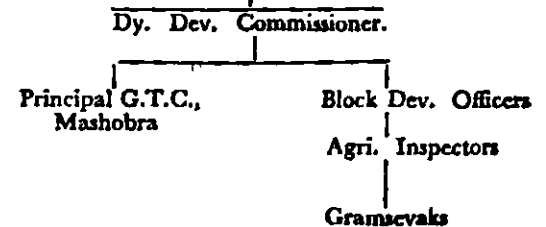
### AGRICULTURE DEPARTMENT



### INDUSTRIES DEPARTMENT



### DEVELOPMENT DEPARTMENT/DEV. COMMISSIONER



ANNEXURE IX

[Ref. Para 3.3.1]

*Proposed set-up of the Agricultural Engineering section for Demonstration and Popularisation of improved Agricultural implements in Fourth Plan in Himachal Pradesh (except Mandi District)*

Name of Post	No. of Post		I Year (Rs.)	II Year (Rs.)	III Year (Rs.)	IV Year (Rs.)	V Year (Rs.)	Total (Rs.)
	1	2	3	4	5	6	7	8
<b>A. Pay</b>								
<i>State Level</i>								
Agricultural Engineer (Class I) (350-40-630/40-870)	1	4,200	4,680	5,160	5,640	6,120	25,800	
Steno-typist (60-4-80/5-120/5-170)	1	720	768	816	864	912	4,080	
Peon (30-1-35)	1	360	366	372	378	384	1,860	
<i>District Level</i>								
Asstt. Agricultural Engineer (Class II) (250-25-550/25-750)	5	15,000	16,500	18,000	19,500	21,000	90,000	
Agricultural Engineering Supervisors (130-10-200/10-320)	5	7,800	8,400	9,000	9,600	10,200	45,000	
Farm Mechanics (75-5-100)	5	4,500	4,800	5,100	5,400	5,700	25,500	
Total Pay		32,580	35,514	38,448	41,382	44,316	192,240	
<b>B. Allowances &amp; Honoraria:</b>								
Dearness Allowance		11,940	11,940	11,940	11,940	11,940	59,700	
Compensatory Allowance		6,646	7,015	7,384	7,753	8,121	36,919	
Other Allowances		2,700	2,700	2,700	2,700	2,700	13,500	
Travelling Allowance		10,000	10,000	10,000	10,000	10,000	50,000	
Total Allowances & Honoraria		31,286	31,655	32,024	32,393	32,761	160,119	



1	2	3	4	5	6	7	8
<b>C. Contingencies:</b>							
(Such as purchase of tool kits, cartage of implements etc.) . . . . .		2,500	2,500	2,500	2,500	2,500	12,500
GRAND TOTAL . . . . .		66,366	69,669	72,972	76,275	79,577	364,859
							Or say Rs. 3.65 lakh

NOTE.—No additional staff is necessary for Mandi] District as it is already having a well-organised programme under the Research Engineer, Research Testing and Training Centre.

This is the minimum suggested staff for the present and the strength of the Agricultural Engineering Supervisors and Farm Mechanics may be increased subsequently and stationed in the Blocks, as and when necessary, with the increase in the quantum of work involved.

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