

Chapter - II
Performance Audit

Chapter-II

Performance Audit

SOIL AND WATER CONSERVATION, AND AGRICULTURE AND FARMERS' WELFARE DEPARTMENTS

2.1 Soil and water conservation in Punjab for sustainable agriculture

Soil and water are two natural resources which play a vital role in agriculture. A Performance Audit was conducted to analyse the soil and water conservation activities for sustainable agriculture in the State which highlighted various deficiencies in planning, financial management and implementation of schemes. While the total financial implication of this performance audit is ₹ 93.01 crore, some of the significant audit findings are given below:

Highlights

- **State does not have an agriculture policy and long term plan for conservation of soil and water, nor does it have a complete inventory of soil, for taking forward soil and water conservation effectively.**
(Paragraphs 2.1.6.1 and 2.1.6.2)
- **Even after spending ₹ 274 crore on Crop Diversification Programme, sown area of paddy increased by 7.18 per cent during 2014-19, adversely affecting the consumption of groundwater.**
(Paragraph 2.1.7.1(v))
- **Cases of stubble burning increased from 43,660 in 2017-18 to 49,905 in 2018-19, owing to lack of systemic spread of awareness amongst stake holders.**
(Paragraph 2.1.7.2(iv))
- **Implementation of Soil Health Card Scheme remained ineffective due to inefficient flow of funds, deficient planning for providing financial assistance for recommended nutrients and non-planning for training and workshops.**
(Paragraph 2.1.7.3(i to iv))
- **The State was deprived of conserving 972.04 lakh cubic metre water despite spending ₹ 37.16 crore on Underground Pipeline Scheme during 2014-19.**
(Paragraph 2.1.7.6(ii))
- **Internal control and monitoring system was found deficient as the Department of Soil and Water Conservation (DS and WC) and Department of Agriculture and Farmers' Welfare (DA and FW) did not review the reasons for shortfall in achievement of targets under any of the schemes.**
(Paragraph 2.1.10)

2.1.1 Introduction

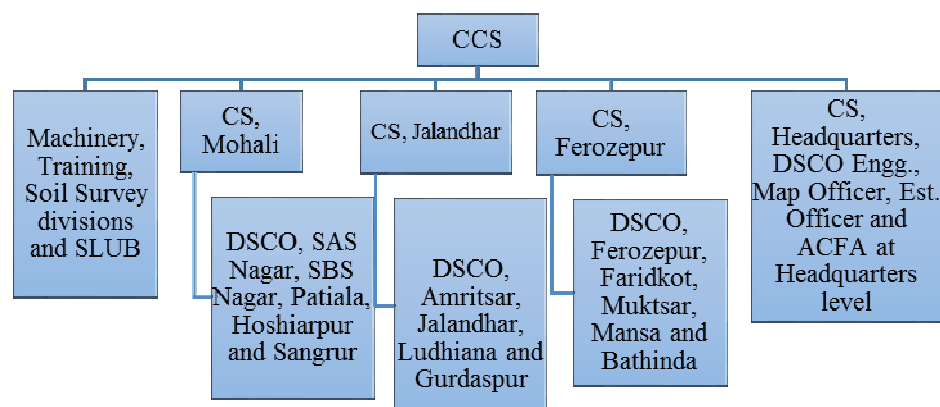
Punjab has 50.33 lakh hectare geographical area out of which, 41.25 lakh hectare (82 per cent) is cultivable. Continuous wheat-paddy rotation to get maximum food production has depleted the macro/micro nutrients, organic contents, minerals and trace elements of the soils. Out of the total irrigated area in the State, 71 per cent of the area is being irrigated by extracted groundwater and 29 per cent by surface water through canals. Unchecked use of groundwater for agriculture had brought the State on the verge of a serious water crisis as 96.59 per cent¹ of extracted groundwater in the State was utilised for irrigation due to which 79 per cent blocks in the State, covering an area of 38.04 lakh hectare area (75.58 per cent of total geographical area of Punjab) were assessed as over-exploited, against 17 per cent in the country. With a view to improve the sustainability of agricultural productivity in Punjab, various schemes were introduced by the Centre/State Government.

Considering the importance of water, United Nations Member States jointly committed (September 2015) to the Sustainable Development Goal-6 (SDG-6) which, *inter alia*, provides for ensuring availability and sustainable management of water and sanitation. Besides, SDG 2.4 provides for implementation of resilient agricultural practices that help to maintain the ecosystem and SDG 6.4 provides for substantial increase in water use efficiency across all sectors. The Department of Soil and Water Conservation (DS and WC) and the Department of Agriculture and Farmers' Welfare (DA and FW) failed to achieve the United Nations sustainable development goals as both the departments did not fix specific targets for achievement of SDGs during the period 2015-19.

2.1.2 Organisational set-up

The DS and WC and the DA and FW are working under the administrative control of the Secretary and the Additional Chief Secretary respectively. The organisational set-up of these departments was as under:

(i) Soil and Water Conservation Department



Chief Conservator of Soils (CCS); Conservator of Soils (CS); Divisional Soil Conservation Officer (DSCO); Assistant Controller of Finance and Accounts (ACFA); State Land Use Board (SLUB).

¹ As per Groundwater Resources Report 2017.

(ii) Agriculture and Farmers' Welfare Department

The Director (Agriculture) is in-charge of four wings² of the Department and each wing has its own Joint Director. Chief Agriculture Officer (CAO) is in-charge of each district of the State, who is assisted by Statistical Officer, District Training Officer, Project Officer, Assistant Agriculture Engineer (Implements) and Agriculture Officer.

2.1.3 Audit objectives

The audit objectives of this performance audit were to ascertain whether:

- schemes/projects were planned in an adequate, comprehensive and effective manner;
- financial management was effective i.e. allocation, release and utilisation of funds earmarked for various schemes was adequate, effective and judicious;
- implementation was done according to the planning in an effective, efficient and economic manner; and
- adequate monitoring and internal control mechanism was in place.

2.1.4 Audit scope and methodology

In order to check the implementation of various schemes relating to soil and water conservation for sustainable agriculture, the Performance Audit covering the period 2014-19 was conducted in DS and WC, and DA and FW between August 2019 and March 2020. Records of the Chief Conservator of Soils, Soil Survey Division, seven³ out of 14 Divisional Soil Conservation Officers (DSCO) of the DS and WC were test-checked. Besides, records of the Director and the Chief Agriculture Officers of seven districts⁴ of the DA and FW were also test-checked. The selection was made by adopting the stratified random sampling method. Implementation of all the seven schemes⁵ was examined and survey in respect of 743 sampled beneficiaries in three⁶ selected schemes was also conducted. Besides, views of Kisan Unions were obtained and incorporated in the PA. Further, in order to substantiate the audit findings on technical issues, a domain expert⁷ was consulted and his views were also taken into consideration.

² (i) Administrative; (ii) Statistical; (iii) Geological; and (iv) Engineering.

³ Divisional Soil Conservation Officers (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Patiala; (v) Sangrur; (vi) SAS Nagar; and (vii) Sri Muktsar Sahib.

⁴ (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Patiala; (v) Sangrur; (vi) SAS Nagar; and (vii) Sri Muktsar Sahib.

⁵ (i) Four schemes viz. Crop Diversification Programme (CDP) (Centrally Sponsored Scheme), Promotion of agricultural mechanism for *in-situ* management of crop residue (CRM) (Central Sector Scheme), Soil Health Card (SHC) and Soil Health Management (SHM) (both Centrally Sponsored Schemes) were implemented by Department of Agriculture and Farmers' Welfare; and (ii) three schemes viz. Underground Pipeline Projects (UGPL) (State Sponsored Scheme), Integrated Watershed Management Programme (IWMP) (Centrally Sponsored Scheme) and Micro Irrigation (Centrally Sponsored Scheme) were implemented by Department of Soil and Water Conservation.

⁶ (i) Crop Diversification Programme (CDP); (ii) Promotion of agricultural mechanism for *in-situ* management of crop residue (CRM); and (iii) Soil Health Card (SHC).

⁷ Former Professor, Punjab Agricultural University, Ludhiana.

An entry conference was held (August 2019) with the Chief Conservator of Soils and the Director, Agriculture and Farmers' Welfare, Punjab wherein audit objectives, scope and methodology were discussed. The audit findings of the performance audit were discussed in the exit conference held (July 2020) with the Conservator of Soils, DS and WC and the Director, DA and FW. The replies of the departments have been suitably incorporated in the Report.

2.1.5 Audit criteria

Criteria, against which the audit findings were benchmarked, were derived from the following sources:

- Guidelines of the selected schemes;
- Guidelines/instructions/orders issued by the Government of India (GoI) and the Government of Punjab (GoP); and
- Punjab Financial Rules and Punjab Treasury Rules.

Audit findings

2.1.6 Planning

2.1.6.1 Soil Survey

The soils in the State of Punjab are of alluvial origin and generally sandy loam⁸ to loamy sand in texture. Adoption of green revolution technologies, introduction of intensive cropping patterns and access to irrigation water has led to astronomic mining of nutrients, which has made the soils deficient in certain essential micronutrients. Further, there was heavy dependence on groundwater for irrigation, which increases with increase in paddy cultivation.

Continuous wheat-paddy rotation to get maximum food production has also contributed in depleting the macro/micro nutrients, organic contents and minerals of the soils. Keeping in view the significance of soil in productivity of crops, the DS and WC has a Soil Survey Division to prepare the inventory of soils in the State after conducting detailed survey. It analyses the samples collected from various places of the State and advises the other departments for efficient use of the soils for sustainable agriculture by sowing appropriate crops.

Audit observed that:

- out of 41.25 lakh hectare (Ha) area under agriculture (as on March 2018), the Soil Survey Division had covered 8.37 lakh Ha under semi detail survey (7.39 lakh Ha) and fertility status survey (0.98 lakh Ha) during 2011-13. Further, the division covered only 7.99 lakh Ha (19.37 per cent) under semi detail survey and 4.98 lakh Ha (12.07 per cent)

⁸ A loam consisting clay less than 7 per cent, silt less than 50 per cent and sand between 43 and 50 per cent.

under fertility status survey in only four districts⁹ during 2014-19 due to non-preparation of long term plan for conservation of soil and water in the State.

- though the Division had a soil testing laboratory, no budget provision was made by the DS and WC despite repeated requests by the Division. Therefore, the laboratory had remained idle during 2014-18.
- the Division did not have any vehicle and Global Positioning System Locator in workable condition for collecting the soil samples to prepare the soil maps of the State. Though the Division submitted (August 2018) proposal for purchase of Geographic Information System (GIS) Software/plotter to the CCS, the same was pending as of November 2020.

However, the Department did not explore the possibility to decentralise the work of preparation of inventory of soils through outsourcing agencies although the work of testing of soil samples during 2017-19 for issuing of Soil Health Cards was completed by the Department by outsourcing the work.

The Conservator of Soils (CS) stated (July 2020) that the remaining districts could not be covered due to shortage of staff as well as non-availability of funds. In the absence of soil survey of the entire State, however, the mandate of advising other departments for efficient use of soils remained to be fulfilled.

2.1.6.2 Non-formulation of Agriculture Policy

With a view to formulate an agriculture policy, the State constituted (April 2012) a committee which was to submit its report within three months. The committee submitted draft agriculture policy to the State Government in March 2013. The salient features of the draft agriculture policy were:

- to ensure a faster and sustainable agriculture development to address interlinked concerns of sustainability of current cropping pattern and stagnating farm incomes;
- to enact a legislation for management of crop residue to check their burning;
- to provide state incentives *viz.* capital assistance, subsidies and assured pricing and marketing for alternate crops to the farmers to diversify from paddy to mitigate the over exploitation of groundwater; and
- research activities need to be strengthened to provide requisite technology for pulses and oilseeds as well, so that these also become economically competitive with rice.

Audit, however, observed that draft agriculture policy was yet to be approved by the State Government (November 2020). In the absence of state agriculture policy, there was no regulatory control for the use of natural resources.

The Director stated (July 2020) that the draft agriculture policy was submitted to the Government in March 2013; approval of which was still awaited. The reply was not acceptable because due to absence of agriculture policy,

⁹ (i) Hoshiarpur; (ii) Patiala; (iii) Ropar; and (iv) Sangrur.

unchecked use of groundwater as well as over-use of fertilisers could not be controlled.

The domain expert engaged for this project also opined that increased production of paddy and wheat in the State had seriously impacted natural resources and sustainability of agriculture.

Recommendation: The State Government may formulate/approve the Agriculture Policy along with a road map for its implementation.

2.1.7 Programme implementation

2.1.7.1 Crop Diversification Programme

The Government of India launched Crop Diversification Programme (CDP) in 2013-14 to diversify area from paddy to alternate crops i.e. maize, kharif pulses (*arhar, moong bean, urd bean, cluster bean*), oilseeds (*soyabean and til*), etc. The need for this arose due to continuous cultivation of water guzzling crops like paddy and frequent flood irrigation which resulted in depletion of groundwater in the State besides continuous cultivation of rice-wheat cropping pattern witnessed the stagnancy in crop yield.

The main objectives of the scheme were to improve soil fertility, maintain dynamic equilibrium of the agro-ecosystem, arrest depletion of groundwater to enhance the farm income and promote technological innovations for sustainable agriculture. To achieve these objectives, various incentives were to be provided to the farmers under the scheme viz.:

- cash support to farmers for land development charges and marketing support;
- organisation of cluster demonstration and to provide subsidy/subsidised inputs such as seeds, pesticides, insecticides, etc. for adoption of alternate crops; and
- assistance for procurement of crop specific farm machinery, etc.

Audit, however, observed various deficiencies in planning, financial management and implementation of the scheme, as discussed in succeeding paragraphs.

(i) Non-constitution of State Level Committee and Programme Management Groups

As per CDP guidelines, a State Level Committee (SLC) was to be constituted for approval of district specific programme, implementation and monitoring of the programme. At district level, a Programme Management Group¹⁰ (PMG) was to be constituted to identify the beneficiaries for cluster demonstrations¹¹ of crops alternative to paddy and collaborate with other stakeholders for

¹⁰ Under the chairmanship of Additional Collector and District Agriculture Officer (DAO) as Secretary and representative of Forest Department, Department of Food Processing, State Agriculture University and KVK (Crop Production).

¹¹ Cluster demonstration unit (1 unit=10 Ha).

implementation of programme at field level and one progressive farmer was to be designated as the group leader for organisation of cluster demonstration.

Audit observed that SLC was not constituted in the State. In six¹² out of seven test-checked districts, PMGs were not constituted whereas in one district Patiala, though PMG was constituted, no meeting was held for identification of beneficiaries. Thus, due to non-formation of PMGs, neither the beneficiaries were identified as per scheme guidelines nor were the clusters formed by designating a progressive farmer as the group leader. As a result, the objective of the scheme to diversify from paddy to alternate crops could not be achieved.

The Director, DA and FW stated (July 2020) that PMGs would be constituted at district level as per guidelines of the scheme. With regard to the selection of beneficiaries, it was stated that they were selected on the basis of application submitted by the farmers. The fact remains that due to non-constitution of SLC and PMGs and non-identification of beneficiaries for cluster demonstrations as per guidelines of the scheme, the benefits could not be transferred to the eligible beneficiaries which reflects lack of vision and non-seriousness of the Department to implement the scheme effectively.

(ii) Irregular coverage of safe blocks with adverse results

As per CDP guidelines, the programme was to be implemented in the notified over-exploited and critical blocks of major paddy growing districts of each State based on recommendation of Central Groundwater Board.

Audit observed that despite 79 per cent blocks covering 38.04 lakh hectare area in the State being over-exploited, the DA and FW spent ₹ 25.22 crore in 14 safe blocks¹³ of four¹⁴ (out of seven) selected districts on various components viz. providing subsidy/subsidised inputs such as seeds, insecticides, pesticides to individual farmers, farm mechanisation, site specific activities, awareness training, etc. But no diversification took place and the area under paddy increased from 3,54,000 Ha to 4,52,000 Ha during 2014-19. Moreover, two¹⁵ of these blocks degraded to semi critical from safe as per Groundwater Resources Report, 2017. This reflects that the Department lacked adequate planning and vision to implement the scheme efficiently.

The Director stated (July 2020) that the expenditure on the safe blocks was incurred to implement the scheme equally in all the districts. The reply was not acceptable as despite spending huge amount on safe blocks, the Department was not able to address the problem of depletion of groundwater.

¹² (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Sangrur; (v) SAS Nagar; and (vi) Sri Muktsar Sahib.

¹³

Stage of groundwater extraction	Category
≤70%	Safe
>70% and <90%	Semi Critical
>90% and <100%	Critical
>100%	Over-exploited

¹⁴ (i) Bathinda; (ii) Hoshiarpur; (iii) SAS Nagar; and (iv) Sri Muktsar Sahib.

¹⁵ (i) Nathana; and (ii) Talwara.

As a result, in four selected districts, groundwater extraction stage has increased between 5.38 *per cent* and 21.43 *per cent*.

(iii) Non-provision of budget for cash support to farmers

As per CDP guidelines, assistance of ₹ 2,500 per hectare (Ha) for land development and ₹ 2,500 per Ha for marketing support was to be given to farmers in cash, to support the losses incurred due to diversion of area from paddy to alternate crops.

Audit observed that cash support was not provided to farmers on account of land development charges and marketing support, in seven selected districts, as no budget provision was made for the purpose, due to which no motivation to farmers was provided to diversify from paddy to alternate crops.

The Director stated (July 2020) that the budget provision was not made with the presumption that the charges would be paid after diversification of crop. As no farmer approached the department, no assistance was provided to them. The Department assured that the budget provision for the purpose would be made in future. The fact, however, remains that due to absence of advance planning by motivating the farmers for crop diversification and identifying eligible beneficiaries, the department did not assess the budget requirement towards financial assistance to the farmers.

(iv) Budget allotment and expenditure

CDP guidelines provide that the funds are to be released on the pattern of Rashtriya Krishi Vikas Yojna (RKVY). Paragraph 10.3 of RKVY stipulated that the State Government was required to utilise 100 *per cent* of funds released up to the previous financial year, 60 *per cent* of funds released during the current year and submit the quarterly physical and financial progress report in time to the GoI for obtaining second installment. The position of funds released *vis-à-vis* expenditure incurred during 2014-19 is given in **Table 2.1**.

Table 2.1: Budget allotment and expenditure incurred during 2014-19

(₹ in crore)

Year	Approved Action Plan		Central Share		State share due	Fund released by State		Total release	Fund position of DA and FW					
	Centre Share	State Share	Release	Short release	Due	Centre share	State share		OB	Funds received	Interest earned	Total funds available	Exp.	CB
2014-15	250.00	0	155.00	95.00	0	125.00*	0	125.00	26.68	125.00	0.25	151.93	123.21	28.72
2015-16	75.00	75.00	37.50	37.50	37.5	67.50	0	67.50	28.72	68.50#	1.66	98.88	57.00	41.88
2016-17	77.96	51.97	6.79^	38.98	25.98	0	25.00	25.00 [@]	41.88	25.00	1.10	67.98	46.77	21.21
2017-18	17.60	11.73	0	0	0	6.79^	25.98	32.77 ^{\$}	21.21	32.77	0.25	54.23	14.09	40.14
2018-19	7.06	4.70	3.53	3.53	2.35	3.53	0	3.53	40.14	3.53	0.69	44.36	32.66	11.70
Total	427.62	143.40	202.82	175.01	65.83	202.82	50.98	253.80		254.80	3.95		273.73	

Source: Departmental data

Note: During 2014-15, the scheme was 100 per cent centrally sponsored, during 2015-16, it was 50:50 and during 2016-2019, it was 60:40.

*Out of ₹155.00 crore released by GoI, ₹30.00 crore were not released during the year but released during 2015-16.

#This includes ₹one crore received back from Principal Chief Conservator of Forest (PCCF) which was transferred directly by Director, Agriculture to PCCF during 2013-14 and ₹30.00 crore pertaining to 2014-15.

@ ₹25.00 crore released against the State share of ₹37.50 crore pertaining to the year 2015-16.

\$ ₹32.77 crore include ₹6.79 crore GoI share and ₹25.98 crore State share pertaining to the year 2016-17.

^Unspent balance of 2015-16 ₹32.19 crore was adjusted against the first installment.

Analysis of the above table showed that against the available funds of ₹ 285.43 crore during 2014-19, an expenditure of ₹ 273.73 crore was made as on March 2019.

- Due to non-fulfillment of conditions of scheme i.e. non-utilisation of previous balance, non-submission of utilisation certificate (UC) in time, central assistance of ₹ 224.80 crore¹⁶ was lost.
- Out of State share of ₹ 65.83 crore, the GoP did not release ₹ 14.85 crore during 2014-19.

Besides, Audit observed the following irregularities:

(a) The DA and FW transferred an amount of ₹ 16 crore¹⁷ to Punjab Mandi Board (PMB) for procurement of two Maize dryers. In the revised approval, two more Maize Dryers were approved (February 2014) by the GoI and instructed to ensure the details of operationalisation and utilisation certificate (UC) from the implementing agency before the funds were released. But the DA and FW had released ₹ 16 crore for additional Maize dryers in May 2014 without ensuring the details of operationalisation and UCs. PMB failed to purchase the additional two Maize dryers and returned the excess amount of ₹ 16 crore in parts with a delay ranging between 14 and 27 months, leading to loss of interest of ₹ 1.04 crore.

(b) As per approved Annual Action Plan, the Joint Director, Agriculture (JDA) transferred (October 2014) ₹ 25 crore to PMB for purchase of five Maize Dryers¹⁸ towards 50 per cent subsidy limited to maximum of ₹ five crore per maize dryer. Audit noticed that PMB purchased (between June 2015 and June 2016) five maize dryers for ₹ 36.84 crore against which subsidy of ₹ 18.42 crore was admissible to PMB. The excess amount of ₹ 6.58 crore was lying blocked with PMB for the last more than five years. Though, after being pointed out (October 2019), the Department had asked (June 2020) PMB to refund the excess amount but it was yet to be recovered (November 2020).

(c) During 2014-19, the Director, DA and FW irregularly spent ₹ 0.63 crore on advertisement published in newspaper not related to CDP. The Director, while admitting the facts (July 2020), noted the point for future compliance.

(v) ***Increase in area under paddy***

With the aim to improve soil fertility and arrest depletion of groundwater, a target to divert 1.40 lakh hectare paddy cultivated area (at least five per cent of area under paddy in identified blocks) with alternate crops during 2013-14 was fixed.

However, it was noticed that the sown area of paddy increased by 7.18 per cent during 2014-15 to 2018-19 and the sown area of other crops

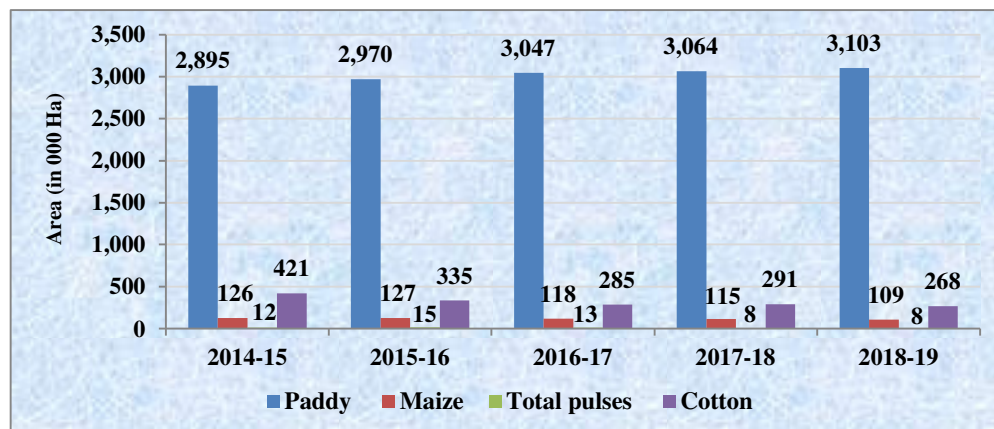
¹⁶ ₹ 175.01 crore due to non-release of 2nd installment, ₹ 32.19 crore adjustment of unspent balance and non-allocation of ₹ 17.60 crore during 2017-18.

¹⁷ ₹ 16 crore on 13.11.2013.

¹⁸ Maize dryer is machine used to reduce moisture contents to the prescribed rate to maximise the storage period.

decreased by 13.49 to 38.02 *per cent* during 2014-15 to 2018-19 in Punjab as given in **Chart 2.1**.

Chart 2.1: Showing increasing trend of area under paddy during 2014-19 in Punjab



Source: Departmental data

Despite spending ₹ 273.73 crore during 2014-19, the DA and FW could not achieve the intended objective of diverting the area from paddy to alternate crops. Rather, area under paddy increased as discussed earlier. Consequently, over-exploited blocks had increased from 76 *per cent* to 79 *per cent* against the National average from 16 to 17 *per cent* during 2014-17, defeating the objective of arresting depletion of groundwater through CDP. Due to inefficient implementation of CDP, the area covered under oilseeds (Kharif) decreased (48 *per cent*) from 8,000 Ha to 4,200 Ha and production was reduced (40 *per cent*) from 5,700 tonne to 3,400 tonne in the State, which would necessitate additional import/procurement of oilseeds. The import of oilseeds had in fact, increased by 25 *per cent* from 14.69 million tonne to 18.41 million tonne, during the period 2014-19, indicating an increased gap between demand and production.

The domain expert also opined that assured market, access to irrigation water, high crop yields and greater economic returns are some of the factors leading to increase in area under paddy. In order to encourage farmers to grow alternate crops including oilseeds and pulses, there should be assured market and the economic returns from the other crops must be similar to that from paddy.

The Director stated (July 2020) that despite all efforts of the Department, farmers were reluctant to diversify as they earned more profits from paddy than alternate crops. The reply did not explain the inadequacy of efforts made by the State Government in encouraging the farmers to grow alternate crops including oilseeds and pulses, with assured market and economic returns at par with that of paddy.

(vi) Non-organisation of cluster demonstrations and non-distribution of farm machinery on custom hiring basis

(a) As per guidelines, cluster demonstration of units¹⁹ of the identified alternate crops in each district would be organised through identified beneficiary groups by designating a progressive farmer. Under the scheme

¹⁹ One unit = 10 Ha.

subsidy on critical inputs viz. seeds, pesticides and insecticides was to be provided at the rate of ₹ 5,000 per Ha.

Audit observed in selected districts that neither the clusters were formed for demonstration nor were progressive farmers designated as group leaders. Further, subsidy on seeds of alternate crops was distributed to individual farmers during 2014-19 without ensuring diversion from paddy to alternate crops. An expenditure of ₹ 25.33 crore was incurred on providing subsidy/subsidised inputs such as seeds, insecticides, pesticides, etc. to individual farmers in the selected districts.

While cross checking the records of beneficiaries, regarding sowing of crops, with revenue records in four districts²⁰, it was noticed that out of 60, only 29 farmers cultivated alternate crops for which subsidy on seeds was provided, whereas 31 farmers did not cultivate the alternate crops despite getting subsidy. For the remaining three districts, data was not received²¹ (November 2020). In the absence of the PMGs, utilisation of subsidy provided was left to the farmers without any follow up.

(b) As per Paragraph (iv) of CDP guidelines, crop specific farm machinery would be provided to the farming community (group of 10 farmers) on custom hiring basis. Further, as per the GoI instructions (June 2013), assistance on farm machinery is limited to ₹ 30,000 per unit for individual beneficiary and more than ₹ 30,000 is admissible only for group of farmers for sharing or custom hiring basis.

Audit observed that subsidy amounting ₹ 14.01 crore (out of which ₹ 4.32 crore was in excess of admissibility) was provided to 3,232 individual farmers for the machinery costing more than ₹ 30,000 in contravention of scheme guidelines in the selected districts and that too without ensuring sowing of alternate crops by the beneficiaries. In selected districts, area under paddy increased from 10.36 lakh Ha to 11.54 lakh Ha during 2014-19, which reflected that subsidy was not utilised for the intended purpose.

While cross checking the records of beneficiaries, regarding sowing of crops, with revenue records in four districts²², audit noticed that out of 40, only one farmer increased his sowing area under alternate crop i.e. cotton from four acres in 2016-17 to 16.4 acres in 2018-19.

The Director stated (July 2020) that although the clusters were not formed, yet the farmers were motivated to grow alternate crops and subsidy on seeds was provided to them on the basis of applications submitted by them. Farmers did not apply in groups for subsidy on machinery, so subsidy on machinery was provided to individual farmers as per their demand, instead of farming community. The reply was not acceptable as the Department provided subsidy to individual farmers contrary to the scheme guidelines, but did not follow up actual utilisation in terms of crop diversification.

(vii) Irregular distribution of subsidy beyond approved action plan

As per the guidelines, assistance on crop specific farm machinery, at the rate

²⁰ (i) Bathinda; (ii) Patiala; (iii) Sangrur; and (iv) Sri Muktsar Sahib.

²¹ Tehsildars: (i) Amritsar; (ii) Hoshiarpur; and (iii) SAS Nagar.

²² (i) Bathinda; (ii) Patiala; (iii) Sangrur; and (iv) Sri Muktsar Sahib.

of 50 *per cent* of the cost of machine, limited to certain extent for different machines²³ was to be provided.

Audit observed that during 2014-19, in six out of seven selected districts, subsidy of ₹ 26.32 crore was disbursed under crop specific farm machinery, out of which ₹ 1.50 crore²⁴ was disbursed on the implements²⁵ which were not approved in the Annual Action Plan (AAP) of CDP.

The Director stated (July 2020) that matter would be examined and instructions will be issued to field units to adhere to the scheme guidelines.

Thus due to lack of vision and intention on the part of Department/ Government causing inefficient implementation of scheme, area under paddy cultivation in the State increased by 7.18 *per cent* during 2014-19.

2.1.7.2 Promotion of agricultural mechanisation for in-situ management of crop residue

The Government of India launched (2018) a special 100 *per cent* central sector scheme to address air pollution, to mitigate the incidences of stubble burning and to provide subsidised machinery required for *in-situ* management of crop residue. The scheme was also meant for preventing the loss of nutrients and soil micro-organism, promoting *in-situ* management of crop residue by retention and incorporation into the soil, promoting custom hiring centres (CHCs) and creating awareness among stakeholders. A State Level Executive Committee (SLEC) was to be constituted to implement the scheme. The GoP prepared annual action plan for 2018-19 comprising of: (i) Establishment of farm machinery banks or custom hiring centres; (ii) Procurement of agricultural machinery and equipments; and (iii) Information, education and communication (IEC) activities for providing awareness to the farmers.

Audit, however, observed various deficiencies in implementation of the scheme, as discussed in the succeeding paragraphs.

(i) Setting up of Custom Hiring Centres

Paragraph 10.1.3 (viii) of the Scheme guidelines provides that the project cost of the CHC should not be less than ₹ 0.10 crore. However, this limit would not apply to the co-operative societies of farmers, registered farmers societies/farmers groups who already possess other implements, provided that the project cost includes more than two equipments for crop residue management.

Audit, however, observed that in Bathinda, 173 CHCs were established during 2018-19. Of these, 137 CHCs established with only one-two equipments of

²³ ₹ 25,000 for Maize Sheller, ₹ 5.00 lakh for portable maize dryer, ₹ 3,000 for powered sprayer, ₹ 25,000 multi-crop thresher, ₹ 2.00 lakh for portable cleaner cum grader for pulses and ₹ 10.00 lakh maize processing unit, etc.

²⁴ (i) Amritsar: ₹ 43.02 lakh; (ii) Bathinda: ₹ 24.57 lakh; (iii) Hoshiarpur: ₹ 19.58 lakh; (iv) Patiala: ₹ 9.02 lakh; (v) SAS Nagar: ₹ 26.84 lakh; and (vi) Sri Muktsar Sahib: ₹ 27.00 lakh.

²⁵ Such as Straw Reaper, Potato Planter, Potato Digger, Straw Chopper, Reaper Binder, etc.

crop residue management. Despite that, financial assistance of ₹ 3.12 crore was provided, in contravention of the Scheme guidelines.

The Director stated (July 2020) that in order to cover maximum beneficiaries, subsidy for one and two implements was also provided. The reply of the Director was not in line with the Scheme guidelines.

(ii) Distribution of farm machinery

Paragraph 5.3.1 of the Scheme guidelines provides that SLEC was empowered to make changes up to 10 per cent in the component-wise allocation approved by the GoI, keeping in view the ground requirements. The GoI made following allocations/releases under the Scheme during 2018-19 as given in **Table 2.2.**

Table 2.2: Budget allotment and expenditure incurred during 2018-19

(₹ in crore)

Year	Total releases	Establishment of CHCs		Distribution of machinery		IEC activities		Flexi funds		Total exp
		Release	Exp	Release	Exp	Release	Exp	Release	Exp	
2018-19	269.38	176.00	174.30	71.30	82.26	16.80	8.65	5.28	1.41	266.62

Source: Departmental data

Examination of records in audit revealed that under the component-‘distribution of machinery’, diversion of ₹ 10.96 crore (15.37 per cent) was made from other components of the Scheme, against the permissible limit of 10 per cent. Despite achieving the targets²⁶ under the ‘distribution of machinery’, the Department failed to control/reduce the number of cases of stubble burning.

It was further noticed that in 10 districts, the number of stubble burning cases increased between 10 and 124 per cent (124 per cent increase was noticed in Fazilka) from 2017-18 to 2018-19. Whereas, in remaining 12 districts, a decrease ranging between one per cent and 68 per cent was noticed during the same period. Further, in three selected districts²⁷, despite spending ₹ 11.77 crore, stubble burning cases increased between 15 and 79 per cent. This reflects that the Department failed to monitor and review the progress and performance of the scheme.

The Joint Director, Agriculture (Engineering) admitted (November 2020) the facts and stated that expenditure would be got regularised.

(iii) Irregular disbursement of subsidy

Paragraph 10.2.3(ii) (b) and (d) of the guidelines of the Scheme provides that farmers not having machinery and equipment and farmers who had not already availed any subsidy during the last two years under any of the scheme of DA and FW for machinery and equipments would be identified for *in-situ* crop residue management.

Audit observed that subsidy of ₹ 0.24 crore²⁸ was irregularly disbursed to 36 farmers in six selected districts for machinery and equipments during

²⁶ Targets: 24,979 and Achievements: 28,609.

²⁷ (i) Amritsar: ₹ 1.95 crore; (ii) Bathinda: ₹ 6.90 crore; and (iii) Sri Muktsar Sahib: ₹ 2.92 crore.

²⁸ (i) Amritsar: ₹ 1.78 lakh (three farmers); (ii) Bathinda: ₹ 4.37 lakh (seven farmers); (iii) Hoshiarpur: ₹ 0.76 lakh (one farmer); (iv) Sri Muktsar Sahib: ₹ 2.50 lakh (four farmers); (v) Patiala: ₹ 10.68 lakh (16 farmers); and (vi) Sangrur: ₹ 3.73 lakh (five farmers).

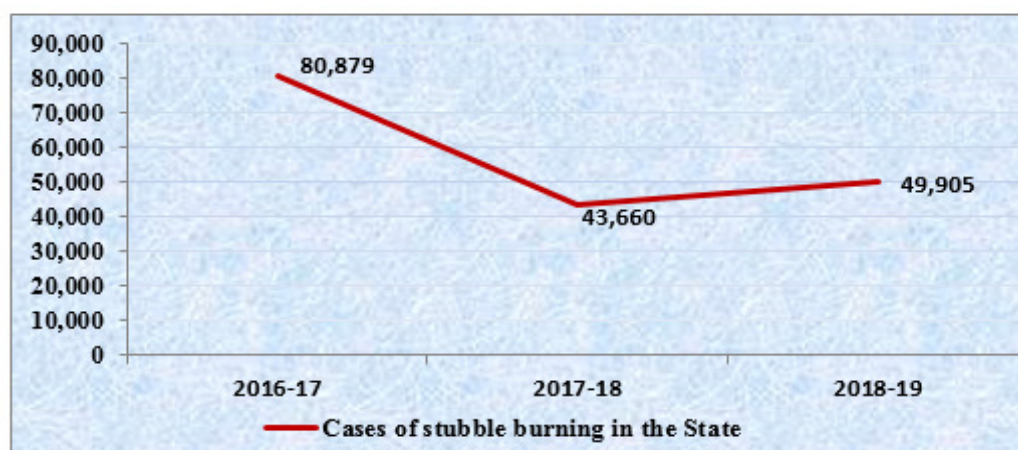
2018-19 who had already availed the subsidy during 2016-18 under another scheme²⁹. Whereas ₹ 1.28 crore³⁰ were disbursed to 210 farmers repeatedly under this Scheme during 2018-19, in contravention of the guidelines of the Scheme.

The Director did not furnish (July 2020) reply relevant to the observation.

(iv) Inadequate IEC activities

One of the most important components of the scheme is IEC activities to create awareness among farmers/stakeholders about stubble burning. The department set annual targets of 4,000 numbers each for demonstration and training activities against which 3,007 (75 per cent) and 384 (10 per cent) demonstration and training activities respectively were conducted. It was seen that cases of stubble burning increased post launch of the scheme (2018-19) as compared to 2017-18. A trend of stubble burning cases during 2016-19³¹ is given in **Chart 2.2**.

Chart 2.2: Trend of stubble burning cases during 2016-19 in Punjab



Source: Data from Punjab Pollution Control Board

The Director stated (July 2020) that narrow season and the ongoing programmes for other components in the Agriculture Sector did not facilitate conducting the trainings and demonstrations. The reply was not acceptable as the objective of the scheme was to reduce the incidences further from the level achieved in 2017-18 which, however, increased to 49,905 during 2018-19. As such, awareness activities conducted by the Department were inadequate and ineffective.

Thus, despite the fact that the State was using Central funds under the Scheme, but due to lack of proper planning and effective efforts at the State level, the stubble burning cases in the State continued, as 49,678 incidences of stubble burning were reported during 2019-20.

²⁹ Sub mission on agriculture mechanisation.

³⁰ (i) Amritsar: ₹ 3.33 lakh (six farmers); (ii) Bathinda: ₹ 54.51 lakh (90 farmers); (iii) Hoshiarpur: ₹ 3.78 lakh (five farmers); (iv) Sri Muktsar Sahib: ₹ 18.27 lakh (33 farmers); (v) Patiala: ₹ 16.07 lakh (24 farmers); (vi) Sangrur: ₹ 29.85 lakh (49 farmers); and (vii) SAS Nagar: ₹ 1.79 lakh (three farmers).

³¹ Data prior to 2016-17 was not available with the Punjab Pollution Control Board.

2.1.7.3 Soil Health Card Scheme

The Soil Health Card (SHC) Scheme was launched in February 2015. Under the scheme, soil health cards were to be issued at least once in every three years to all farmers, so as to provide a basis to address nutrient deficiencies in fertilisation practices, strengthen functioning of Soil Testing Laboratories (STL), and diagnose soil fertility related constraints with standardised procedures for sampling uniformly across the State, analysis and design *taluka*/block level fertiliser recommendations for the targeted districts.

In order to capture the soil fertility changes occurring due to plant uptake or other natural causes, more attention is required on the follow up measures on the soil nutrient deficiencies identified in soil health cards. For effective implementation of the scheme, farmers were to be provided financial assistance, training through workshops to identify the deficiencies in soil and recommend nutrients for specific types of soils.

Following irregularities and deficiencies were noticed in implementation of the scheme:

(i) *Non-conducting of training and workshops*

Paragraph 17.1 of the guidelines of the Scheme provides that orientation for technical and line staff along with the State Agriculture University (SAU)/Indian Council of Agriculture Research was to be conducted by the State. Further, the training was to be given to farmers, officers and staff as per norms of assistance of different components.

Audit observed that in six³² out of seven districts, neither any orientation for technical or line staff was conducted nor was any training imparted to farmers, officers and staff during 2014-19. Due to lack of capacity building, information about utilisation of soil health cards, promotion of best nutrient management practices and judicious use of fertilisers could not be disseminated.

The Director admitted (July 2020) that targets for training and workshops fixed during 2015-16 and 2018-19 were not achieved. It was further stated that a State level workshop for field staff was held in 2017-18 at the Punjab Agricultural University, Ludhiana on soil sample collection methodology on the basis of grids. However, efforts would be made to conduct training for technical and line staff as well as farmers in future as per the Scheme guidelines.

(ii) *Budget allotment and expenditure*

Under the Scheme, funds were to be released by the GoI to the GoP in installments. The State was required to submit utilisation certificate, annual physical and financial progress reports and annual audited statement of accounts. Funds were to be issued by the GoI and the GoP in the ratio 75:25

³² (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Patiala; (v) SAS Nagar; and (vi) Sri Muktsar Sahib.

during 2014-15 and 60:40 during 2015-19. The details of funds received and expenditure incurred during 2014-19 is given in **Table 2.3**.

Table 2.3: Budget allotment and expenditure incurred during 2014-19

(₹ in crore)

Year	Budget allocation (pattern)		Total	Funds released by GoI		Funds released by FD		Total funds released by FD	Interest earned	Total funds available with department	Exp	Unspent balances	Savings against available funds (in per cent)
	CS	SS		CS	CS	SS							
2014-15	0.26	0.09	0.35	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015-16	4.24	2.83	7.07	3.05	1.99	0.09	2.08	0.02	2.10	0.34	1.76	83.80	
2016-17	9.58	6.39	15.97	0.00	0.00	0.00	0.00	0.05	1.81	0.27	1.54	85.08	
2017-18	7.52	5.01	12.53	0.00	0.00	0.00	0.00	0.05	1.59	1.56	0.03	1.89	
2018-19	8.12	5.41	13.53	2.97	1.07	1.47	2.54	0.01	2.58	2.54	0.04	1.55	
Total	29.72	19.73	49.45	6.28	3.06	1.56	4.62	0.13		4.71			

Source: Departmental data

Analysis of the above table showed that:

- Out of total releases of ₹ 6.28 crore by the GoI, the GoP did not release ₹ 3.22 crore during 2014-19 for implementation of the Scheme.
- Out of the Central allocation of ₹ 29.72 crore, the GoI did not release ₹ 23.44 crore due to non-submission of UCs for the previous releases.
- Out of the State allocation of ₹ 19.73 crore, only ₹ 1.56 crore (eight per cent) were released by the GoP.

Audit observed that in two³³ out of seven test checked districts, there was short utilisation of released funds ranging between 23 and 100 per cent³⁴ during 2015-16 to 2018-19.

The Director stated (July 2020) that funds were not utilised during 2015-17 due to indecision about the sampling methodology. Due to non/short utilisation of funds in these years, the balance allocated funds were not released by the GoI. As regards the State share, it was stated that adequate funds were not released by the Finance Department (FD).

The reply was not acceptable and it confirmed the slack approach of the Department in implementing the Scheme at every level, right from delay in decision on the sampling methodology to short release of funds by the State FD, and short utilisation of the limited funds released, which adversely affected the scheme objective of assessment and improvement of soil health.

(iii) Non-achievement of intended objective

The Scheme guidelines provide that diagnostic soil health assessment of fields of the farmers was to be taken up periodically, so as to issue soil health cards at least once in three years to the farmers. In the irrigated areas, samples would be drawn in a grid of 2.5 Ha and in rain fed areas, sampling would be done in a grid of 10 Ha area. Paragraph 14.4 (ii) of the guidelines provides that in irrigated areas, large, medium and semi-medium holdings would be sampled and tested holding-wise. A cycle consisting of two years was fixed

³³ (i) Patiala; and (ii) SAS Nagar (Mohali).

³⁴ (i) Patiala: 23-79 per cent during 2016-17 to 2018-19; and (ii) S.A.S Nagar: 24-100 per cent during 2015-16 to 2018-19.

for soil samples testing. The expected outcome of the scheme was to reduce the consumption of chemical fertilisers by 20 *per cent*.

The details of targets and achievements of soil samples testing during 2014-19 is given in **Table 2.4**.

Table 2.4: Targets and achievement of soil testing

Year	Target of Soil Samples to be tested	Soil samples tested	Soil Health Card Issued	Short achievement of target	Short fall (in <i>per cent</i>)
2014-15*	Nil	Nil	Nil	Nil	Nil
2015-16 (cycle I)	4,17,763	1,75,000	1,85,500	2,42,763	58
2016-17(cycle I)	4,17,763	1,81,200	1,95,800	2,36,563	57
2017-18 (cycle II)	4,17,763	1,71,500	1,92,200	2,46,263	59
2018-19 (cycle II)	4,17,763	8,34,544	15,15,852	Nil	Nil

Source: Departmental data

* Scheme was launched in February 2015.

Audit observed a shortfall of soil sample testing ranging between 57 and 59 *per cent* during 2015-16 to 2017-18 in the State. In three selected districts³⁵, shortfall in soil samples testing ranged between 14 and 79 *per cent* during 2015-16 to 2017-18. Punjab has a total 41.25 lakh Ha cultivable area and 10.51 lakh farmers. The department issued 3.81 lakh SHCs only during 2015-2017 (1st cycle) and 17.08 lakh SHCs during 2017-19 (2nd cycle).

During the first cycle i.e. 2015-17, the soil samples were collected and tested without forming the grid as provided in the guidelines. As a result, the department did not have the data about the grid (area) from which the samples were drawn. However, during the second cycle i.e. 2017-19, the soil samples were collected by forming a grid of 5 Ha area of land against the norms of 2.5 Ha fixed by the GoI. Moreover, it was not ensured to prepare the grid according to the land holding (i.e. large, medium and semi-medium) to collect the samples as the department did not maintain such data. Though the department has covered the entire cultivable area of 41.25 lakh Ha during the second cycle, yet the changes in status of soil could not be compared even after completion of two cycles due to non-formation of grid in 1st cycle coupled with non-maintenance of data regarding the samples of soils tested during the 1st cycle.

Further, it was noticed that the consumption of Urea and Di-Ammonium Phosphate (DAP) was in the proportion of 80:20 in the State during 2014-19. Audit noticed a meagre reduction of seven *per cent* (from 31.35 lakh metric tonne in 2014-15 to 29.15 lakh metric tonne in 2018-19) in the consumption of urea (a major fertiliser consumed in the State). Due to non-achievement of target of soil samples, the objective of the scheme to reduce the consumption of chemical fertilisers by 20 *per cent* was not achieved. Consequently, farmers were deprived of the potential benefit in terms of reduction in input cost on account of fertilisers, and enhanced yield by adopting correct quantity of fertiliser suited to the soil type. This was endorsed in the beneficiary survey where 61 *per cent* of farmers had adopted the recommended quantity of

³⁵ (i) Mohali: 24 to 48 *per cent*; (ii) Patiala: 26 to 72 *per cent*; and (iii) Sri Muktsar Sahib: 14 to 79 *per cent*.

fertilisers as per the soil health card. 56-58 *per cent* of farmers surveyed informed that they achieved higher yield with the use of recommended fertilisers.

The expert opined that comparison of soil test reports after a period of three years could provide information regarding aggrading or degrading of soils which is an important indicator of sustainability. This enables the department to adjust fertiliser dose with respect to change in soil nutrients.

The Director stated (July 2020) that targets of testing of soil could not be achieved due to shortage of staff and infrastructure in the laboratories at field level. However, targets of soil samples testing were achieved during the second cycle by outsourcing the soil samples testing. The department admitted that although the overall reduction in fertilisers consumption was 8.84 *per cent* but reduction in DAP was about 19 *per cent*. The reply was not acceptable because due to non-achievement of targets during first cycle, the results of second cycle could not be compared to ascertain the changes in soil nutrients. As a result, the Department did not recommend the optimum dose of fertilisers according to the soil nutrients. Consequently, a meagre reduction in the consumption of urea was noticed during the period under audit. Therefore, the objective of the scheme to capture soil fertility changes occurring over a period of time and taking appropriate remedial measures could not be achieved.

(iv) Deficient planning in financial assistance for recommended nutrients

Paragraph 16.2 of the guidelines provides that the financial assistance for soil test based nutrient balancing was to be provided in the targeted villages as detailed in Annexure V of the guidelines.

Audit observed that 20,89,352 SHCs were issued to the farmers in the State during 2014-19. However, it was noticed that in none of the districts, Annual Action Plan (AAP) was prepared for compilation at the State level for release of financial assistance for recommended nutrients under the scheme. As a result, no expenditure was incurred against ₹ 0.32 crore released by the GoI during 2015-16 and 2018-19. Therefore, no further funds were released by the GoI. Thus, failure of the department to ensure preparation of AAP led to non-utilisation of available funds and consequently further releases from the GoI were denied which resulted into denial of financial assistance to the farmers for balanced nutrients in their farms. This indicated at the non-seriousness of the Government in implementing the scheme to achieve the intended benefits.

The Director agreed (July 2020) with the audit observation.

(v) Non-analysis of all the parameters of soil samples

Paragraph 14.5 (i) of the guidelines of the Scheme provides that soil samples should be processed by following the standard procedures and analysed for various parameters namely, pH³⁶, Electrical Conductivity (EC), Organic Carbons (OC), available Phosphorus, Potassium, Sulphur, Magnesium, Calcium and micronutrients (such as Zinc, Ferrous, Manganese and Copper).

³⁶ Power of Hydrogen.

Audit observed that 21 Soil Testing Laboratories (STL) falling under the jurisdiction of seven selected districts, had tested 5,54,692 soil samples but against the prescribed 12 parameters, only three to nine parameters were tested which were not sufficient to recommend the micronutrients required to maintain good health of soil. The domain expert, while disclosing various deficiencies³⁷ in soil nutrients of Punjab, opined (June 2020) that at least 10 parameters³⁸ were required to maintain the fertility of soil for a long period. The Director admitted (July 2020) the facts.

Thus, due to failure of the Department to efficiently implement the Crop Diversification Programme to diversify the area to alternate crops, depletion of micro/macro nutrients and ameliorants³⁹ of soils could not be preserved for maintaining good soil health.

Recommendation: The Department should ensure to address the critical issue of maintaining good soil health for sustainability of soil conservation by collecting and testing the samples as per the scheme guidelines.

2.1.7.4 Soil Health Management Scheme

The Government of India launched Soil Health Management Scheme in 2014 with the objective of strengthening Soil Testing Laboratories (STL), capacity building through training of STL staff/ extension officers/ farmers and field demonstration/ workshops, etc. on soil health management/ Integrated Nutrient Management/ balanced use of fertilisers, creation of data bank for site specific balanced use of fertilisers and strengthening of fertiliser quality control system.

Funds were to be released by the GoI to the State on the basis of progress report, submission of utilisation certificates of earlier sanctioned projects, specific emergent needs, etc. During 2014-15 and 2015-19, ratio of funding by the GoI and the GoP was 75:25 and 60:40, respectively. The budget allotment and expenditure for the last five years is given in **Table 2.5**.

Table 2.5: Budget allotment and expenditure incurred during 2014-19

Year	Budget allocation (pattern)		Total	Funds released by GoI		Funds released by State		Total funds released by State	Interest earned	Total funds available with department	Expenditure	Unspent balances	Savings against available funds (in per cent)
	CS	SS		CS	CS	SS							
	2014-15	3.91		0.00	3.91	1.51	1.51						
2015-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	1.57	0.57	1.00	63.70	
2016-17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	100	
2017-18	9.87	6.58	16.45	2.47	0.00	0.00	0.00	0.00	1.00*	0.00	0.00	0.00	
2018-19	5.67	3.78	9.45	0.99	1.30	0.10	1.40	0.00	1.40	1.40	0.00	0.00	
Total	19.45	10.36	29.81	4.97	2.81	0.10	2.91	0.06		1.97			

Source: Departmental data

* ₹99.50 lakh returned to GoI during 2017-18.

Analysis of the above table showed that:

- against the budget allocation of ₹ 3.91 crore by the GoI during 2014-15, no allocation was made by the GoP during 2014-17. As a result, the GoI did not allocate any further funds during 2015-17;

³⁷ Organic Carbon (33 per cent); Sulphur (25 per cent); Zinc (22 per cent); Phosphorous (15 per cent); Manganese (11 per cent); etc.

³⁸ Apart from Calcium and Magnesium.

³⁹ A substance that helps plants to grow by improving the physical condition of soil.

- against the allocation of ₹ 10.36 crore towards the State share during 2017-19, only ₹ 0.10 crore (one per cent) were released by the GoP during 2018-19;
- against the releases of ₹ 1.51 crore by the GoI during 2014-17, the department utilised only ₹ 0.57 crore and returned the balance ₹ 1.00 crore (including interest of ₹ 0.06 crore) to the GoI during 2017-18; and
- out of ₹ 3.46 crore released by the GoI during 2017-19, the State FD released only ₹ 1.30 crore.

Audit further observed that an amount of ₹ 1.40 crore transferred to the Punjab Agri Export Corporation Limited (PAGREXCO) in January 2019 for purchase of ICP⁴⁰ was still lying with them as the purchase was under process (November 2020). Interestingly, the UC of this amount had already been submitted to the GoI by the Department without ensuring its utilisation.

The Director admitted the facts and stated (July 2020) that efforts would be made to utilise the funds.

(i) Ineffective implementation of the Soil Health Management Scheme

Out of 61 STLs in the State, only 17 were equipped with Atomic Absorption Spectrophotometer (AAS) required for estimation of micro nutrients of soil samples solution. Out of 21 functional laboratories in seven selected districts, 15 were not equipped with AAS and these were not capable of analysing the various parameters of soil such as: Zinc, Iron, Copper, Manganese, etc.

Audit observed that:

- In five⁴¹ districts, demonstration was not given on the balanced use of fertilisers during 2014-19 except 2015-16. In SAS Nagar and Sri Muktsar Sahib, it was not given at all.
- In six⁴² districts, no training was imparted during 2014-19.
- In six⁴³ districts, farmers' fair for awareness about the scheme was not organised.
- No assistance for micro nutrients was provided to the farmers during 2014-19 in any of the selected districts.

The Director stated (July 2020) that the process was initiated for strengthening of STLs and it would be completed shortly. Regarding the training and demonstrations, the department stated that the funds were not released for training and demonstration by the State Government. The reply was not acceptable because despite availability of funds, the department failed to purchase ICP; consequently targets of strengthening of laboratories were not achieved to provide the valuable inputs to farmers for maintaining good soil health.

⁴⁰ Inductively Coupled Plasma Spectrophotometer (ICP).

⁴¹ (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Patiala; and (v) Sangrur.

⁴² (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Mohali; (v) Patiala; and (vi) Sri Muktsar Sahib.

⁴³ (i) Amritsar; (ii) Bathinda; (iii) Hoshiarpur; (iv) Mohali; (v) Sangrur; and (vi) Sri Muktsar Sahib.

Thus, lack of intention to implement Crop Diversification Programme efficiently coupled with non/short release of funds by the State as provided in the Soil Health Card and Soil Health Management Schemes led to inadequate infrastructural facilities for analysing/maintaining the soil health.

Recommendation: The Department should ensure sufficient funds and utilise them to strengthen the STLs in the State so that the farmers could be advised about the optimum use of fertilisers.

2.1.7.5 Micro irrigation

The Government of India (GoI) launched (2010) the National Mission for Micro Irrigation with the objective to increase the area under micro irrigation through improved technology, increase water use efficiency and to promote, develop and disseminate micro irrigation technology for agriculture/ horticulture development with modern scientific knowledge. Under the mission, 40 per cent of the cost of micro irrigation system would be provided by the GoI, 10 per cent by the GoP and the remaining 50 per cent would be borne by the beneficiaries. However, under Paragraphs 6.1 and 6.2 of the guidelines, the State Government was free to provide additional financial assistance⁴⁴ to lessen the burden on an individual beneficiary. Accordingly, the GoP provided additional financial assistance restricted to maximum area of five hectare per beneficiary after taking loans from NABARD during 2014-19.

(i) Budget allotment and expenditure

The funds allocated and expenditure incurred under the scheme during 2014-19 is given in Table 2.6.

Table 2.6: Funds allocated and expenditure incurred during 2014-19

(₹ in crore)

Year	Approved outlay			Funds released		Opening balance with the department	Funds released by the FD					Expenditure	Closing Balance
	CS	SS	NABARD	CS	NABARD		CS	SS	NABARD	Interest	Total		
2014-15	7.06	3.25	9.33	0.00	9.20	12.87	0.00	2.59	0.00	0.28	15.74	6.45	9.29
2015-16	5.89	0.66	10.10	0.00	0.00	9.29	0.00	0.56	6.7	0.3	16.85	10.12	6.73
2016-17	5.00	2.53	9.19	1.18	15.53	6.73	0.00	2.25	8.1	0.18	17.26	10.74	6.52
2017-18	1.53	0.44	2.50	0.00	0.00	6.52	0.38	0.44	2.5	0.09	9.93	3.13	6.80
2018-19	3.00	1.23	10.00	6.00	0.00	6.80	0.78	1.21	8.27	0.00	17.06	9.69	7.37
Total	22.48	8.11	41.12	7.18	24.73		1.16	7.05	25.57	0.85		40.13	

Source: Departmental data

Audit observed that:

- due to non-fulfillment of conditions of the scheme such as non-submission of the UCs in time, non-utilisation of previous instalments, short release of the State share (₹ 1.06 crore), the State could not avail the Central assistance of ₹ 15.30 crore during 2014-19.
- out of ₹ 7.18 crore released by the GoI, the State FD had released ₹ 1.16 crore only during 2014-19.

⁴⁴ 95 per cent borne by GoP through NABARD loan and 5 per cent was to be paid by the beneficiary.

The Conservator of Soils (CS) stated (July 2020) that the GoI funds could not be utilised in time due to non-release of funds by the FD. Reply from State FD was awaited (November 2020).

(ii) Non-achievement of targets

The scheme provides that the coverage of one Ha of area under micro irrigation would conserve 4,000 cum of water. The State had assessed (2007-08) 3.80 lakh Ha of potential area which could be conserved under micro irrigation. Out of this, the Department had already covered an area of 27,979 Ha up to 2013-14. Target and achievement of area covered under micro irrigation during 2014-19 is given in **Table 2.7**.

Table 2.7: Target and achievement of area covered under micro irrigation

Year	Target (in Ha)	Achievement (in Ha)	Shortfall	Shortfall (in per cent)
2014-15	5,000	875	4,125	82.50
2015-16	4,133	1,799	2,334	56.47
2016-17	3,000	1,951	1,049	34.97
2017-18	1,300	600	700	53.85
2018-19	1,300	507	793	61.00
Total	14,733	5,732	9,001	61.09

Source: Departmental data

Against the target of 14,733 Ha area to be covered under micro irrigation during 2014-19 in the State, the Department could cover only 5,732 Ha (38.91 per cent) leaving shortfall of 61.09 per cent. The reasons as observed in audit were non/short release of the Central and the State share which in turn denied Central assistance of ₹ 15.30 crore.

Audit observed that in selected districts, against target of 6,782 Ha, fixed in the Annual Action Plan, only 2,408.34 Ha (35.51 per cent) area could be covered, resulting into a shortfall of 4,373.66 Ha (64.49 per cent).

The Conservator of Soils stated (July 2020) that the progress was low due to delayed and inadequate availability of funds. Moreover, the actual market cost of micro irrigation system was higher than the GoI cost norms. The reply was not acceptable because the department even failed to mobilise the available resources efficiently (as depicted in **Table 2.6**).

Due to non/short release of funds, the targets of Annual Action Plan could not be achieved, consequently depriving the State of conserving 36 million cum⁴⁵ water.

2.1.7.6 Underground Pipeline Scheme

To improve the yield and quality of farm produce with the efficient use of surface as well as ground water resources, the following projects were implemented in the State by raising loan from NABARD (95 per cent) and five per cent to be contributed by the State Government. Financial assistance was to be provided to farmers for adopting underground pipeline system to irrigate their fields under the projects.

⁴⁵ One Ha conserves 4,000 cum water per annum; and 9,001 Ha. (the shortfall) would conserve 36 million cum water per annum.

Details of projects of Underground Pipeline Scheme and targets

Name of the project	Details of Project and targets
Rural Infrastructure Development Fund (RIDF) XVII	The project was for judicious use of available water and harvesting of rainwater for enhancing irrigation potential in the State by constructing rainwater harvesting structures. Under the scheme, 12 districts were selected with the aim to cover 30,577 Ha area and it was to be completed at a cost of ₹ 130 crore up to 31 March 2014.
RIDF XVIII	The project was for laying of underground pipeline for irrigation from sewage treatment plants (STP).
RIDF XXI	The project was for providing assured irrigation water to the waterlogged areas in south western districts of the State. The aim was to cover 7,551 Ha area up to 31 March 2018 at a cost of ₹ 60 crore.
RIDF XXII	The project was for laying of underground pipeline system for conveyance of irrigation water in canal command areas. The project was started in 11 districts of the State which was to be completed at a cost of ₹ 116.96 crore up to 31 March 2019.

(i) Details of available funds and expenditure

Details of funds available and expenditure incurred on the above mentioned projects during 2014-19 is given in **Table 2.8**.

Table 2.8: Funds available and expenditure incurred on four projects of UGPL Scheme during 2014-19

(₹ in crore)										
Year	Opening Balance	Funds released by NABARD 95 per cent	State Share five per cent	Total releases	Total Funds available	Funds released by FD/Try.	Funds not released	Expenditure	Unutilised	Percentage of unutilised funds
	1	2	3	4 (2+3)	5 (4+1)	6	7 (5-6)	8	9 (6-8)	10
2014-15	49.71	0.00	0.00	0.00	49.71	21.16	28.55	20.52	0.64	3
2015-16	28.55	30.26	1.59	31.85	60.40	21.26	39.14	20.49	0.77	4
2016-17	39.14	60.76	3.19	63.95	103.09	32.81	70.28	31.59	1.22	4
2017-18	70.28	0.00	0.00	0.00	70.28	19.86	50.42	18.03	1.83	9
2018-19	50.42	18.76	0.98	19.74	70.16	37.47	32.69	21.45	16.02	43
Total		109.78	5.76	115.54		132.56		112.08	20.48	

Source: Departmental data

- The State did not release ₹ 32.69 crore during 2014-19 though the funds were released by NABARD to the FD.
- Utilisation of released funds ranged between 91 and 97 per cent during 2014-18 which came down to 57 per cent in 2018-19.

Due to short release and non-utilisation of funds, the projects could not be completed as of March 2019.

The CS stated (July 2020) that the projects could not be completed as the entire funds were not released by FD/NABARD.

(ii) *Non-achievement of targets*

- **Rural Infrastructure Development Fund (RIDF) XVII project** was to be completed by March 2014. Under the project, 30,577 Ha area was to be covered but only 28,187 Ha (92 per cent) area was covered upto March 2019, despite delay of more than five years from the scheduled date of completion due to non/short release of funds from the State.
- **Under RIDF XVIII project**, 40 UGPL schemes for irrigation from sewerage treatment plants (STP) were to be completed to cover 13,060 Ha area. However, it was noticed that only 29 projects were completed upto March 2019 in the State at an expenditure of ₹ 21.69 crore. Out of 11 incomplete projects, six⁴⁶ were in the five selected districts where expenditure of ₹ 2.29 crore was incurred. Against the target to conserve 176.10 million litre water per day (MLD), only 125 MLD water could be conserved.
- **Under RIDF-XXI project**, against the target area of 7,551 Ha, only 2,316 Ha (31 per cent) was covered under UGPL up to March 2019 at an expenditure of ₹ 25.75 crore in the State. Therefore, the Department failed to conserve 143.96 lakh cum (5235 x 2750⁴⁷) water per annum. Due to non-completion of project, farmers/beneficiaries were also deprived of the accrued benefits of ₹ 18.61 crore (₹ 35,545 per Ha x 5,235) per annum. Whereas, in Sri Muktsar Sahib, against the target of 6,922 Ha, only 1,806 Ha (26 per cent) area was covered up to March 2019.
- **Under RIDF-XXII project**, as of March 2019, the Department achieved the physical target of 2,880 Ha (9 per cent) only against the total target of 32,992 Ha in the State after spending ₹ 11.41 crore. Non-completion of the project not only deprived the farmers/beneficiaries of the intended benefits of ₹ 107.03 crore (₹ 35,545 per Ha x 30,112 Ha) per annum on account of accrued income, but the State was also deprived of conserving 828.08 lakh cum (2,750 cum/Ha x 30,112) water which would affect the long term sustainability of agriculture in the State. In four selected districts, against the total target of 2,075 Ha, only 1,299 Ha (63 per cent) area was covered after spending ₹ 3.21 crore (March 2019).

The CS stated (July 2020) that the projects could not be completed due to non-release of the entire funds by the Finance Department/NABARD. However, reply of the FD was awaited (November 2020).

(iii) *Supply of polluted water to farmers*

As per terms and conditions of Schedule II of RIDF-XVIII approved (February 2013) by NABARD, drawals for UGPL may be permitted only after submission of completion certificate of Sewerage Treatment Plant (STP)

⁴⁶ (i) Sangat; and (ii) Rama Mandi (Bathinda); (iii) Khanauri (Sangrur); (iv) Rajpura (Patiala); (v) Sadabarat (SAS Nagar); and (vi) Jalalabad road Muktsar (Sri Muktsar Sahib).

⁴⁷ Covering one Ha area under scheme conserves 2,750 cum water per annum.

along with Water Quality Report from the Punjab Pollution Control Board (PPCB), certifying its fitness for irrigation purpose, besides frequent quality checks of the treated water would be carried out by the Department.

Under RIDF-XVIII, the Department spent ₹ 21.69 crore (March 2019) on completion of 29 UGPL projects for providing treated water from STPs for irrigation but did not ensure the requisite Water Quality Report from the PPCB certifying fitness of the treated water for irrigation purpose.

Audit observed that the PPCB conducted tests on completed UGPL projects during March 2018 and June 2019. The test reports showed unsatisfactory water quality as the value of prescribed parameters was found beyond normal values in respect of 3 to 15 completed projects during tests in March 2018 and in 3 to 25 completed projects during June 2019 as given in **Table 2.9**.

Table 2.9: Tests conducted in March 2018 and June 2019

Name of parameter ⁴⁸	Parameters fixed		Parameters found				No. of STPs in which test failed			
	For raw crops ⁴⁹	For cooked crops ⁵⁰	March 18		June 19		March 18		June 19	
			For raw crops	For cooked crops	For raw crops	For cooked crops	For raw crops	For cooked crops	For raw crops	For cooked crops
Power of Hydrogen (pH)	6.5 to 8.3		8.6 to 8.9		8.47 to 9.46		3	3	3	3
Chemical Oxygen Demand (COD)	Not specified	30	---	33 to 366	---	32 to 384	Not specified	14	Not specified	21
Bio-chemical Oxygen Demand (BOD)	10	20	12 to 120	38 to 120	11 to 145	25 to 145	12	8	16	12
Total Suspended Solids (TSS)	Nil	30	10 to 164	32 to 164	8 to 238	38 to 238	15	9	25	10
Faecal Coliform	Nil	230	920 to 3100	920 to 3100	280 to 1,40,000		15	15	25	25

Source: Departmental data

Analysis of the above table showed that the Department failed to ensure the quality of treated water before being supplied to farmers.

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pH and TSS Power of Hydrogen and Total Suspended Solids	Irrigation with water of high power of Hydrogen (pH) and total dissolved salts can affect soil health depending on the type of salts present. Long term use of these water can affect physical properties of soil particularly related to soil moisture characteristics.
COD and BOD Chemical Oxygen Demand and Bio-Chemical Oxygen Demand	COD and BOD are attributes indicating the presence of bacteria and chemicals in the water that influence oxygen supply. Drinking polluted water affects human health but no direct hazard implications can be associated with these.
Faecal coliform	Faecal coliform are indicative of the extent of pathogen present in the water that affect human and animal health.

⁴⁹ These are crops which are eaten in raw form such as tomato, onion, radish, etc.

⁵⁰ These are crops which are eaten after cooking such as rice, wheat, pulses, etc.

The CS stated (July 2020) that it had laid the infrastructure of UGPL system for use of treated water of STPs for irrigation. Further, the operation, maintenance and ensuring quality of treated water is the responsibility of concerned local body/sewerage board operating the STP and water user society of the concerned UGPL project. No damage to crops was noticed at any site due to supply of treated water. The reply was not acceptable because it was responsibility of the Department to obtain Water Quality Report from the PPCB certifying its fitness for irrigation purpose besides ensuring the quality through drawing random samples frequently. But the DS and WC did not ensure provision of hygienic water for irrigation purpose, despite spending ₹ 21.69 crore on the project.

2.1.8 Human Resource Management

Availability of sufficient manpower is a pre-requisite for successful implementation of any project/scheme. Shortage of manpower was noticed in Soil Survey Division and Soil Testing Laboratories as discussed below:

(i) Soil Survey Division

Audit observed that there was shortage of staff in Soil Survey Division as given in **Table 2.10**.

Table 2.10: Sanctioned Strength and Person in Position in Soil Survey Division

Name of the Post	Sanctioned Strength (SS)	Person in Position(PIP)	Vacancy	Shortfall (in per cent)
Soil Conservation Officer	08	04	04	50
Surveyor	12	07	05	42
Laboratory Attendant	01	0	01	100
Khalasi	09	02	07	78
Total	30	13	17	

Source: Departmental data

An overall shortage of 57 per cent in the Soil Survey Division was noticed. The Division had taken up the issue of shortage of staff with the Department in its monthly returns. However, the matter was taken up with the higher authorities only in July 2020. But the fact remains that the posts are still lying vacant (November 2020). It showed that the department had not taken soil survey work on its priority for preparation of soil map work.

(ii) Soil Testing Laboratories

Agriculture Development Officer (ADO) is posted in Soil Testing Laboratory to test the soil samples. He also maintains the stock register of chemicals, glassware and machinery. Laboratory Assistant is to prepare the chemical solution for soil testing and assists ADO in testing. Laboratory Attendant is to receive the soil samples from the farmers and enter in the Sample Receiving Register and give the soil health card to the concerned farmer. The Sanctioned Strength (SS) and Person in Position (PIP) in four technical cadres in the seven selected districts is given in **Table 2.11**.

Table 2.11: Sanctioned Strength and Person in Position in four technical cadres

Name of post	SS	PIP	Vacancy	Shortfall (in per cent)
Soil Testing Officer	12	11	1	8
Agriculture Development Officer	18	14	4	22
Lab Assistant	20	12	8	40
Lab Attendant	24	10	14	58

Source: Departmental data

- Shortage of technical staff in four cadres ranged between eight and 58 per cent. Therefore, out of seven selected districts, in three districts shortfall in soil testing ranging between 14 and 79 per cent was noticed during 2015-16 to 2017-18.
- Audit observed that there was no sanctioned post of four technical cadres in nine STLs of seven selected districts. However, these laboratories were functioning with the help of other non-technical staff of Agricultural Technology Management Agency (ATMA) scheme.

The Departments stated (July 2020) that the matter would be taken up with higher authority to fill the vacant posts. However, the fact remains that shortage of staff had affected the testing of soils.

2.1.9 Impact assessment

2.1.9.1 Beneficiary survey conducted by audit

Audit along with concerned officials of DA and FW, and DS and WC visited 470 villages to conduct beneficiary survey of various schemes. Besides, nine Kisan Unions were also approached to obtain their comments about implementation of various schemes and to know the grievances of the farmers with regard to getting the benefits of the schemes. However, comments from only four⁵¹ Kisan Unions were received and these have also been incorporated in the succeeding paragraphs.

(i) Crop Diversification Programme

Out of 450 selected beneficiaries under CDP, 254 were enquired and it transpired that:

- Area under paddy cultivation increased in 14 cases (5.5 per cent), remained stagnant in 200 cases (79 per cent) and decreased in 14 cases (5.5 per cent) in six districts during 2014-19 whereas 26 farmers did not respond.
- Sowing of paddy was preferred by 207 farmers (81 per cent) due to assured marketing, Minimum Support Price (MSP) and assured yield. Of 207 farmers, 49 had also cited free power supply as one of the reasons for sowing of paddy whereas, 47 farmers gave various reasons for sowing paddy.

⁵¹ (i) Bharti Kisan Union Ekta, Ugraha; (ii) Bharti Kisan Union, Lakhowal; (iii) Bharti Kisan Union, Rajewal; and (iv) Azad Kisan Sangharsh Committee, Jaitakalan (Amritsar).

- 247 farmers (97 per cent) stated that they would prefer to grow alternate crops in case the Government provides assured marketing, higher MSP and viability gap funding, whereas seven farmers did not respond.
- Subsidy on machinery was paid to 254 farmers individually (100 per cent) instead of paying it to farming community (group of 10 farmers) for alternate crops.
- 151 farmers (59 per cent) were interested to grow paddy even without power subsidy. 48 farmers (19 per cent) were not interested to grow paddy if power subsidy was not available. 55 farmers did not respond.
- Before sowing of crops, 236 farmers (93 per cent) were aware about MSP.
- 136 farmers (53 per cent) had electric tube-well in their fields, whereas 112 farmers (44 per cent) had both canal fed supply and electric tube-well supply in their fields.
- 197 farmers (78 per cent) stated that they would grow alternate crops, if profits (as in the case of paddy) are assured.

(ii) *In-situ management of crop residue*

Out of 708 selected beneficiaries under the scheme, 320 were enquired and it was observed that:

- To manage crop residue in their fields, 305 farmers (95 per cent) used the machinery provided under the scheme. Out of 305 farmers, 264 farmers had stopped stubble burning.
- Before receipt of subsidised machinery, 279 farmers (87 per cent) were burning their crop residue.
- 250 farmers (78 per cent) stated that stubble burning was the easiest way to dispose of the crop residue.
- To promote *in-situ* management of crop residue, 212 (66 per cent) farmers wanted cash incentive along with MSP from the Government.
- Out of 273 farmers to whom training was imparted, 265 (97 per cent) were satisfied with the training/awareness camps organised under the scheme.
- 282 (88 per cent) farmers were satisfied with the approved dealers regarding quality and pricing of the machinery in comparison to other dealers.

(iii) Soil Health Card Scheme

Under the scheme, 743 beneficiaries were enquired and it transpired from the survey that:

- 452 farmers (61 *per cent*) had received soil health cards.
- Fertiliser consumption was reduced in case of 410 (55 *per cent*) farmers.
- Training for use of soil health card/soil fertility map was imparted to 449 (60 *per cent*) farmers.
- Due to soil health cards and soil fertility maps, 482 farmers (65 *per cent*) were benefitted in selection of source and amount of fertiliser application.
- 451 farmers (61 *per cent*) used fertilisers in their field as per recommendations of the soil health cards.
- Use of fertilisers as recommended in the soil health card had increased the yield of paddy for 251 farmers (56 *per cent*) and yield of wheat for 262 farmers (58 *per cent*).

The following shortcomings in implementation of schemes were brought to the notice of audit by four Kisan Unions:

- i. The diversification from paddy to other crops was not done as paddy and wheat were procured on MSP and in spite of MSP of other alternate crops, the same were not procured on MSP as the market price was less than the MSP.
- ii. There was no assured marketing in respect of alternate crops.
- iii. The distribution of soil health card was not upto mark as these were being distributed by villagers instead of departmental officers.
- iv. In view of very high cost of machinery provided under *in-situ* management of crop residue scheme, the marginal and small farmers were not capable to purchase and use the machinery.

2.1.10 Monitoring, Internal Control and Evaluation

In **Crop Diversification Programme**, the State Level Committee was not constituted under the scheme due to which the monitoring mechanism was ineffective. Further, due to non-submission of the UCs to the GoI, the State was denied Central assistance of ₹ 224.80 crore under the scheme. Thus, due to non-monitoring, the scheme was not showing the desired results.

The Director admitted (July 2020) the facts.

In-situ Management of Crop Residue Scheme provides for third party assessment of efficacy, performance, outcome and shortcomings to take corrective measures. However, no such assessment was made to review the scheme implementation efficiency.

The department admitted the facts and stated (June 2020) that third party assessment would be conducted in current year.

Under Soil Health Card Scheme, in seven selected districts, one *per cent* random checking of analysed samples, as provided in the guidelines, was not done by the external agency for ensuring the quality of soil analysis. Similarly, in all the selected districts (except Amritsar), no joint certificate regarding satisfactory collection of soil samples was issued by CAO, *Sarpanch* and *Gram Sevak*, as provided in the guidelines. As a result, the Scheme could not be implemented effectively.

The Director admitted (July 2020) the facts.

Under Soil Health Management Scheme, the State Standing Technical Committee was not formed for monitoring of the Scheme due to which the ICP/AAS were not purchased. Consequently, strengthening of soil testing laboratories could not be made.

The Director stated (July 2020) that State level committee was constituted under National Mission for Sustainable Agriculture (NMSA). The reply was not acceptable as State Standing Technical Committee was required to be constituted.

2.1.11 Conclusions

The DS and WC, and the DA and FW had under-performed in restoring the ecological balance of soil and water conservation for sustainable agriculture in the State despite spending ₹ 699.24 crore on the various schemes. The State was yet to enact legislation to protect regional specific ecological and national resource management besides addressing depletion of groundwater, soil degradation and climate change. Soil Survey Division did not have adequate infrastructure to conduct effective soil survey. Crop Diversification Programme, did not make any impact as there was an overall increase in the sown area of paddy (7.18 *per cent*) while that of alternate crops decreased up to 38.02 *per cent*. Cases of stubble burning increased post implementation of the Scheme to mitigate the issues relating to crop residue. Implementation of Soil Health Card Scheme remained partial and achieved reduction in consumption of fertilisers of 8.84 *per cent* against the target of 20 *per cent*. The soil testing laboratories lacked requisite infrastructure, due to which valuable inputs to the farmers regarding soil health could not be provided. The DS and WC did not cover 35,347 Ha target area in Underground Pipeline Scheme, thereby not conserving 972.04 lakh cum water per annum. Besides, shortage of staff and inadequate monitoring at the State level also contributed to ineffective implementation of the various schemes.

2.1.12 Recommendations

In the light of audit findings, the State Government may consider to:

- (i) formulate State Agriculture Policy urgently so that assured marketing for alternate crops could be provided to achieve the target of crop diversification besides ensuring a roadmap for implementation of all the schemes;
- (ii) ensure preparation of inventory of soils for the entire State and regular updation thereof to facilitate efficient use of the soils;
- (iii) take effective measures to check over-exploitation/extraction of groundwater in the State;
- (iv) implement Crop Diversification Programme as per the scheme guidelines under institutional monitoring, for actual utilisation of the assistance provided, at the same time economic viability of adopting diversification of crops must be examined and appropriately communicated to the farmers;
- (v) evaluate the effectiveness of awareness programmes in minimising the cases of stubble burnings and revise the level and frequency accordingly for the desired impact;
- (vi) re-evaluate prices of machines for *in-situ* management of crop residue for small and marginal farmers;
- (vii) motivate the farmers to participate in various schemes to maintain/improve the soil fertility and to prevent depletion of groundwater;
- (viii) strengthen the laboratories for testing of all parameters of soil by updating the mapping and inventory of State soil for regulating the quantity of fertilisers used in the fields; and
- (ix) strengthen the monitoring and internal control mechanism for effective implementation of the schemes.

The matter was referred to Government in May 2020, their reply was awaited (December 2020).

