

CROP HUSBANDRY PLAN

The broad options available for removing constraints and improving the crop productivity in Ludhiana district of Punjab include accelerating seed replacement and seed treatment, reviving soil health, conservation of irrigation water, introduction of legumes and introduction of improved technologies along with their dissemination to the farmers. The details of these options and financial requirements for their introduction and promotion are discussed as below:-

A. PROGRAMMES FOR SOIL HEALTH IMPROVEMENT

1. GREEN MANURING

Growing and incorporation of legumes, green manures is a beneficial practice for improving soil health. Dhaincha, sun hemp, cowpea and short duration pulses such as moong-bean are important legumes which can fix large amount of N from the atmosphere and add organic matter on their incorporation. Dual purpose summer moong can provide additional income to farmers by producing about 10 q/ha of pulse grains. However, presently green manure crops occupy about 3000 ha out of 3 Lac ha in the district. **It is proposed to increase the area under green manuring after wheat harvest to about 6,000 ha per year with Dhaincha seed and 500 ha with moong-bean during the next five years by supplying good quality seed.**

2. MANAGEMENT OF FARM WASTES

Improper storage of animal manure and other household wastes by the farmers results in large nutrient losses leading to its poor quality. There is a need to prepare manure pits for the proper storage of farm wastes. **It is proposed to build 200 pits per block in 12 blocks each year and to provide an incentive of Rs 5000/- per pit directly to the farmers.**

3. INTEGRATED NUTRIENT MANAGEMENT

Integrated Plant Nutrient Supply (IPNS) is an important component of sustainable agricultural intensification. The goal of IPNS is to integrate the use of all natural and man-made sources of plant nutrients, so as to increase crop productivity in an efficient and environmentally benign manner and improve the soil health. In order to promote the use of INM technology by the farmers, **it is proposed to conduct 50 demonstration trials of one ha each in every block and an amount of Rs.4000 per farmer is needed to provide inputs to the farmers.**

4. SOIL AND WATER TESTING

To avoid imbalanced use of fertilizer, soil testing facilities for both macro and micronutrients at block level is needed. Presently, there are four soil testing laboratories Khanna, Samrala, Machhiwara, Jagaron in the district with only Khanna having facilities for micronutrient testing in soils but all these labs need re-strengthening in terms of equipment and staff. These soil

and water testing facilities on strengthening can test about 1.5 Lac samples per year. The Ludhiana district is also served by the PAU labs. Thus there is a need to strengthen the soil testing laboratories to handle about 30000 samples per lab each year. The other three labs should be upgraded to test the micro-nutrients.

To keep the record of the soil fertility and quality of irrigation water of each and every farm of the Ludhiana district, **a scheme ‘Soil & Water Health Card’ (SWHC) is proposed.** This SWHC will be prepared by the field staff of the Agriculture Department by testing the soil fertility level of the farmer’s fields for major as well as micro- nutrients. The fitness of the available water for irrigation to various crops will be tested through water test. A record of the treatment / practices recommended and adopted for the soil and water health will be kept in SWHC. The date wise entries of various farm inputs will be made in this card by the input suppliers. The farmers will be educated in record maintenance and usefulness of SWHC through Training Camps / Field Days / Mass Campaign etc. The entries must be up dated at the start of the season i.e. Rabi and Kharif every year. The problems and improvements will be recorded by the **Farm Scouts** who will be deputed on every two villages. Farm Scout will be minimum +2 in Science with ‘Two Month Training’ from Agriculture Department. **To streamline the SWHC Scheme, Mobile Diagnostic Van for Soil and Water Testing and to diagnose the pests, diseases at the farmer’s field must be provided for all the 12 blocks of the district.**

6. MICRO-NUTRIENTS FERTILISERS

In addition, there is need to encourage the **use of micro and secondary nutrients** on the basis of soil and water tests. Based on the large scale sample tests of soil and water, the Department of Soils, Punjab Agricultural University Ludhiana has mapped the soil health status for important micro-nutrients (Zinc – Zn, Iron – Fe, Manganese – Mn). Accordingly the requirements of these micronutrients work out to be as follows:

Table A-1: QUANTITY AND COST OF MICRONUTRIENTS

(Estimates in Rs. Lac)

Micro-nutrient	Area 000 ha	Crop				Total quantity of micro nutrient s (tones)	Price Rs thousan d per tonne	Total cost Rs Lac
		Whea t	Rice	Maiz e	Cotton			
		Rate of application Kgs / ha						
	% area affecte d	257	250	2	1			
Zn	10		62.5	25	25	1570	25	392
Fe	7		15	15	15	266	15	40

Mn	14	10				360	50	180
Total	31							612

Zinc Sulphate is applied in 2-3 year cycle and other nutrients are required every year for the affected area. Based on this, the total plan estimate at 50 % incentives for Ludhiana district comes out to Rs.208 Lac per year.

TABLE A-2: BLOCK WISE SOIL TYPE & DEFICIENT MICRO-NUTRIENT

S. No.	Block	Alluvial	Alkaline	Deficient Micro-Nutrient
1	Ludhiana I	M-H	Normal	Zn, Mn
2	Ludhiana II	M-H	N-A	Zn , Mn
3	Machiwara	M-H	Normal	Zn , Mn , Fe
4	Samrala	M-H	Normal	Zn
5	Khanna	M-H	Normal	Zn
6	Doraha	M-H	N-A	Zn , Fe
7	Dehlon	M-H	Normal	Zn , Fe , Mn
8	Pakhowal	M-H	Normal	Zn , Fe
9	Sudhar	L-M	Normal	S , Zn, Mn
10	Raikot	NA	NA	NA
11	Jagraon	L-M	Normal	S , Zn, Mn
12	Sidhwan Bet	M-H	Normal	Zn , Fe

Note: L = Light; M = Medium; H = Heavy; N-A = Non-alkaline

PLAN ESTIMATE FOR REJUVENATING SOIL HEALTH (Rs. Lac)

	Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Green Manuring						
	i. Supply of green manure seed @ 75% incentives: 6,000 ha @ Rs1000/ha	60	60	60	60	60	300
	ii. Supply of mungbean seed @ 75% incentives for 5,000 ha @ Rs 2700/ha	135	135	135	135	135	675
2	Mgmt of farm wastes : Construction of 2400 pits each year	120	120	120	120	120	600
3	INM On-farm trials-600 /year	24	24	24	24	24	120
5	Soil testing						
	i) Up-gradation and strengthening of one lab as Micro-Nutrients Lab	30	-	-	-	-	30
	ii) Strengthening of other 3 existing labs	15	-	-	-	-	15
	iii) Operational costs for 4 labs (Rs 3.00 Lac each)	12	12	12	12	12	60
	iv) Mobile Diagnostic Van (MDV) for 12 blocks	72	-	-	-	-	72
	v) Equipment / Glassware for MDVs	12	6	6	6	6	36
	vi) Salary of Driver & Lab. Asstt.	14.4	14.4	14.4	14.4	14.4	72
	vii) POL / Maintenance	12	12	12	12	12	60
6	Micro-nutrients 50 % incentives	200	200	200	200	200	1000
	TOTAL	706.4	583.4	583.4	583.4	583.4	3040

B. STRENGTHENING OF COOPERATIVE SOCIETIES:

Agricultural machinery is very expensive. For each and every crop, different kinds of machinery are required. Small and marginal farmers cannot afford the machinery for each crop. So the machinery should be provided through village level cooperative societies or farmers' club, focal points on 50 % incentives for custom hiring services. It may be provided to farmers. It will reduce the burden of increasing cost of machinery owned by the small farmers individually. Some cooperative societies in Ludhiana are already running the custom hiring services with limited equipment and need re-strengthening. More cooperative societies should be assisted to run efficient Service Centres for large machinery and equipment

C. SEED REPLACEMENT & SEED TREATMENT:

1. SEED REPLACEMENT

Continuous use of the same seed loses its potential of high-yield. Therefore, the seed of every crop should be replaced after every three years for general varieties and after every year for hybrid varieties. The wheat yield stagnation or fall after 2000-01 in the district may be mainly attributed to the non-replacement of the wheat seed.

Presently rate of seed replacement is = about 10 %

Required rate of seed replacement is = 33 per cent

Seed replacement cost (40000 q every year) at Rs 500 per q incentives

= 200 Lac per annum i.e. 1000 Lac for five

years.

2. SEED TREATMENT

Seed treatment is a very important factor, which enhances the yield considerably by way of protecting the crops. The seed treatment is such a component in the total cost of cultivation/production, which involves a meagre cost but its role is much higher. Therefore, any incentive to the farmer to increase the extent of seed treatment will have a positive impact on crop productivity. Seed treatment cost of all crops for Ludhiana district works out to be less than Rs.80 Lac per year with 50 % incentives means the plan budget cost of Rs.**200 Lac for 5 years**

D. PROMOTION OF PULSES

Pulses are important crops to provide a high value food, nutritional security and alleviate malnutrition of poor masses. These also play a vital role in improving soil health and conserve natural resources essential for sustainable agriculture. The development of short-duration pulses varieties offers the most valuable options for promoting pulses in the cropping system in Ludhiana district on a large scale. In Punjab, at present pulses are grown on about 36000 ha with total production of 28000 tonnes per annum (recorded). The area in Punjab under summer moong and summer mash is not recorded officially, but according to rough estimate, the area under summer moong and mash is about 50,000 ha and 3000 ha, respectively. Punjab requires about 5 Lac tonnes pulses per annum but total production is around 80 thousand tonnes. Thus, there is a great scope to increase the area and production of pulses in the state. Moong, arhar and mash are the important summer/*kharif* pulses while gram and lentil are grown in *rabi* season. Summer moong and summer mash cultivation has a great scope as a large area remains fallow after the harvesting of wheat and before the transplanting of rice. The summer moong variety SML 668 which matures in 60 days can be grown to increase pulses production, farmers' income and improve soil fertility as well as facilitate to avoid early transplanting of rice resulting in saving of irrigation water. **Pulses can be grown in various rotations like summer moong after wheat, potato, toria, raya, barley. (ii) arhar – wheat, (iii) rice-gram/lentil, (iv) intercropping of moong/mash/gram in sugarcane and orchards.** Adequate production

and distribution of quality seed of improved varieties should be ensured. The important steps to increase the production of pulses include improved seed replacement rate in pulses, providing assured market and encouraging Self Help Groups for marketing, training, demonstrations, promoting value addition and providing the necessary machinery for processing (11 Dal mills, graders and cleaners for each of 11 blocks) to be provided to Service Centre (Cooperative Society)

Table D-1: Expected Area under Important Pulses (Hectares)

Crop	2009	2010	2011	2012	2013
Kh moong	3000	4000	5000	6000	7000
Summer moong	3000	5000	10000	15000	20000
Arhar	2000	2500	3500	4000	5000
Gram	500	750	1000	1500	2000

STRENGTHENING OF BIO- FERTILISER LAB

Due to intensive agricultural practises and monopoly of strengthen Paddy-Wheat crop rotation, soil fertility is adversely affected. To meet out food grains requirement of our country, use of chemical fertilisers has increased many folds. There is a great economic loss to the farmers due to over use of a large quantity of Chemical fertilisers in the crops. Moreover, chemical fertilisers are harmful to human health. A large number of Cancer patients were confirmed in Cotton Belt of Punjab due to excessive use of Chemicals for Cotton Crop. Now the farmers of Punjab are moving towards Eco-friendly farm inputs like use of organic fertilisers, Bio-fertilisers, Neem based pesticides etc. **Increasing demand of Bio-Fertiliser leads to demand of up-gradation and re-strengthening of Bio- Fertiliser Lab**, already existing in the office of Chief Agriculture Officer Ludhiana. The detail of re-strengthening of Bio- Fertiliser Lab. Project along with expected expenditure is given as below:

STRENGTHENING & UP-GRADATON OF BIO-FERTILISER LAB

Sr. No.	Items	Amount (Rs. Lac)	Remarks
1.	Building and Infrastructure	30.00	Working Lab, Quality Control Lab, Instrument Room, Packing Room, Office, Store, Laminar Air Flow (approx.4200 sq. ft covered area)
2.	Machinery and Equipments	40.00	Generator 20 KW, AC 1.5 Ton 3 units, Thermo - graphic Growth Chamber, Autoclave, IT facility, Incubator(BOD), Spectrometer, Shaker, Laminar Air Flow, Hot Air Oven, Refrigerator, Phase Contact Microscope, Sealing Machine, Electronic Balance, Physical Balance, Mini- truck, etc.
3.	Glass ware and raw material	07.00	Glass ware, charcoal Powder, Chemicals, Packing Material, etc.
4.	Staff Salary	180.00	ADO, Mechanic/Electrician, Lab. Asstt. (5), Driver, Peon –cum- chowkidar(3)
5.	Recurring Expenses	10.00	Electricity / Telephone Bills, Glass ware, Machinery Repair, Petrol and Diesel
	TOTAL	267.00	

Rs. 267 Lac for 1st year and Rs. 190 Lac for 2nd, 3rd, 4th, and 5th year.

Grand Total: Rs. 1027 Lac

PROPOSAL FOR PULSES PROMOTION SCHEME

S. No.	Particulars	Amount (Rs Lac)
1	Seed Production/Replacement	50.00
2	Seed Treatment	10.00
3	Biofertilizers/ <i>Rhizobium</i> inoculation	10.00
4	Strengthening of Bio-Fertilizer Lab	1027.00
5	Incentives for Storage bins	50.00
	Total :	1147.00

E. ADOPTION OF IPM TECHNOLOGY IN RICE

Rice is an important cereal and staple food of more than 60 per cent of the world population. In Punjab, it was cultivated over an area of 26.42 Lac hectares with an average production of 101.93 Lac tones during 2006 (Anonymous). All parts of rice plants are vulnerable to insect feeding from the time of sowing till harvesting. Rice crop is damaged by number of pests like brown plant hopper, *Sogatelle furcifera*, white back plant hopper, *Nilaparvatge lugens* (Stal) and green plant hopper *Nephotetlix virescence*, yellow stem borer, *Scirpophage incertulus* (Walker), white stem borer *S. innotata* (Walker), rice leaf folder, *Cnaphalocrosis medinalis*, and many other important pests. Farmers are using insecticides indiscriminately to control these pests. This leads to problems like residue, resurgence and resistance of pests, etc. Besides, it may also affect the biodiversity by eliminating natural enemies complex and non target pests. The adoption and promotion of rice IPM technology at the village levels required to increase and sustain the productivity of rice. This can only be achieved through implementation of IPM Programme. To begin with, it is proposed to cover 2 villages per cluster in the first year, where one **Farm Scout** will be appointed for 6 months for intensive surveillance and monitoring of insect pests and diseases for need based application of insecticides, based on ETL level of different pests. An information centre will be set up in the village for the farmers for various IPM based activities. The IPM is to be expanded to cover ultimately 9 clusters of 2 villages each per block in the 5th year of the plan.

PLAN ESTIMATES FOR IPM TECHNOLOGY IN RICE (Rs. Lac)

	Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
	Target no of village clusters	15	30	45	75	100	
1	One Farm Scout @ Rs.2500 per month for 2 villages for 6 months plus Rs.5000 for information centre = Total	3	6	9	15	20	53

	Rs.20000 per cluster						
	Total Rs. Lac	3	6	9	15	20	53

F. HELPING THE SMALL AND MARGINAL FARMERS

i. POPULARIZATION OF NET HOUSE TECHNOLOGY

The practice of net house cultivation of vegetable is modern technique. It has capacity to increase the productivity of vegetables by manifold along with improved quality through avoidance of pesticides. This technology is very helpful to small and marginal growers, which helps them to produce vegetable with advance maturity as well as increasing fruiting span and productivity. It is need of the hour to popularize this technology among vegetable growers

During the first year **2500 net houses of one kanal** will be constructed at farmer's field in each block of the district to demonstrate the benefit of the technology. Target is to cover about 22000 net houses in Ludhiana district. Besides, one net house of one *kanal* will be constructed at each government farm during the first year to demonstrate the recommended production technology for growing vegetable.

An incentive of Rs 20000 per net house is proposed. The total incentive amount will be Rs. 4400 Lac for small and marginal farmers. Year wise plan estimates are given below:

PLAN FOR NET HOUSE CULTIVATION OF VEGETABLES (Rs. Lac)

	Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
	<i>Target no. of net houses</i>	<i>2500</i>	<i>3500</i>	<i>4500</i>	<i>5500</i>	<i>6000</i>	<i>22000</i>
1	Capital incentives @ Rs20000 per net house	500	700	900	1100	1200	4400
	TOTAL	500	700	900	1100	1200	4400

ii. POPULARIZATION OF NUTRITIONAL KITCHEN GARDEN

Fruits and vegetables are a major source of nutrition, vitamins and protein. In this day the rural people particularly women and children suffer from the lack of vitamin and minerals. Nutrition garden can play an important role to solve this problem. Besides this, it also helps in the economy and nutritional security of the peoples.

According to ICMR, each person requires 96 g of fruits and 300 g of vegetable per day (Including 120 g of leafy, 90 g of root and 90 g of fruits vegetables). The family of eight members will require about 2.4 kg of vegetables and 800 g of fruits. This production can be had from 500 sq. m. area by growing different vegetable and fruits

Five villages from each block of the district will be selected and one demonstration of kitchen garden will be laid out in each village in each year. They will be provided with input and training to raise the kitchen garden. Besides this, seed kits of summer and winter vegetables and three fruit trees (Guava, Kinnow and Lemon) will be distributed to each (year wise detail in table)

BUDGET REQUIREMENT (Rs. Lac)

		Ist Year	IInd Year	IIIrd Year	IV th Year	V th Year	Total
Demonstration of Nutritional kitchen garden (Including Inputs)	No.	55	55	55	55	55	275
	Cost @ Rs 800/-	4400.00	4400.00	4400.00	4400.00	4400.00	22,000
Distribution of seed kits	No.	2000	3000	4000	5000	6000	20,000
	Cost @ Rs 20/-	80,000	1,20,000	1,60,000	2,00,000	2,40,000	8,00,000
Fruits Plant	No	6,000	6,000	6,000	6,000	6,000	30,000
	Cost @ Rs20/-	1,20,000	1,20,000	1,20,000	1,20,000	1,20,000	6,00,000
Total cost		2,04,400	2,44,400	2,84,400	3,24,400	3,64,400	14,22,000

iii. PROMOTION OF HONEY PROCESSING

Installation of Comb foundation mill for sheet production requires Rs.45 Lac and operation charges will be Rs 3 Lac per year. It should be arranged with some cooperative venture on 100 % incentives. These will be provided to the farmers at cost basis. The total cost amounts to Rs 0.60 crores for the plan period. The Honey processing plant will involve cost of Rs 0.06 crores, which should also be with that Cooperative Society. The Society may also be provided some assistance for surveys and mass campaigns for honey production @ 25000 per event will amount to Rs 5 Lac in 5 years

iv. MUSHROOM CULTIVATION

Ludhiana district is producing 1147 and 1246 thousand metric tones of rice and wheat in a year and provides **an equal amount of straw, which can be used to produce mushrooms.** At present, Punjab Agricultural University, Ludhiana recommends four mushroom varieties for its indoor cultivation under natural environmental conditions. They are *Agaricus bisporus* (button mushroom) & *Pleurotus spp. (dhingri)* in winter season and *Calocybe indica* (milky mushroom) and *Volvariella spp.* (paddy mushroom) in summer season. However, commercial cultivation of only button mushroom has been established in Ludhiana with 20-25 mushroom growers in the district. With the present proposal, other mushroom varieties can be popularized through creating awareness via technical training courses to motivate people to adapt mushroom growing as profession and for others as consumers to raise the demand. The mushroom cultivation process can be adapted if farmers after technical training are provided with quality seed and compost along with consultancy by the technical staff. Keeping these points in mind, following budget lay out is proposed for the mushroom production in Ludhiana district.

BUDGET REQUIREMENT (Rs. Lac)

Item	/Year	I	II	III	IV	V
Non Recurring Cost						
Create spawn production lab at Deptt. of Hort., Ludhiana		10.0	-	-	-	-
Create compost production unit at Deptt. of Hort., Ludhiana OR Strengthening of composting unit at PAU, Ludhiana		10.0	-	-	-	-
Recurring Cost						
Running spawn production lab		2.5	2.5	2.5	2.5	2.5
Running compost unit		2.5	2.5	2.5	2.5	2.5
Training in 5 blocks adopting one village each year covering 25 villages in 5 years		0.6	0.6	0.6	0.6	0.6
Total		25.6	5.6	5.6	5.6	5.6

ESTIMATES FOR HELPING SMALL AND MARGINAL FARMERS (Rs. Lac)

	Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1	Net house cultivation of vegetables	500	700	900	1100	1200	4400
2	Nutritional gardens	2	3	3	3	3	14
3	Honey (Processing facility with Cooperative society / SHG)	51	6	6	6	6	75
4	Mushroom cultivation	26	6	6	5	5	48
	TOTAL	579	715	915	1114	1214	4537

G. TECHNOLOGY DISSEMINATION

i. INFORMATION TECHNOLOGY CENTRES:

The technology dissemination system needs to be improved in the district. Today, agriculture as a commercial enterprise needs to be scientific, high-tech and precision based. The technology is fast progressing for which the farmers should be trained effectively. There should be at least one **Farm Information Technology Centre** at each block level for the benefit of farmers.

COST OF THE FARM INFORMATION TECHNOLOGY CENTRES (Rs.

Lac)

	Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1.	Information Technology Centre with all equipment	240	-	-	-	-	240
2	Operational costs	24	24	24	24	24	120
	TOTAL	264	24	24	24	24	360

ii. MASS CAMPAIGNS:

The types of technology interventions and the scale to which it should be disseminated and effectively adopted require mass campaigns to be organized. The important mass campaigns are for Soil testing, Laser leveling, Integrated Nutrient Management, Resource conservation technologies like leaf colour charts, tensiometers, Integrated Pest Management, Congress grass eradication, IPM, Rat control, etc.

PLAN ESTIMATES FOR MASS CAMPAIGNS (Rs. Lac)

	Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1.	To cover expenses of materials, travelling and contingency related to mass campaigns	25	25	25	25	25	125
	TOTAL	25	25	25	25	25	125

To get these programme implemented effectively, the **Manpower Resources** for the transfer of technology is very essential along with the necessary support for mobility and materials. **BUT** in the department of agriculture, **mobility support is negligible and staff position is inadequate.**

TOTAL PROJECT COST FOR REVITALIZING AGRICULTURE SECTOR

(Rs.

Lac)

	Programme	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1	Improving soil health	706.4	583.4	583.4	583.4	583.4	3040
2	Service Centres with Cooperatives	720	720	720	720	720	3600
3	Improving the seed replacement and seed treatment	443	443	443	443	443	2215
4	Promotion of Pulses Schemes	321	214	214	214	214	1177
5	Helping the small & marginal						

	farmers with net houses for vegetable cultivation, nutritional garden, honey and mushroom	579	715	915	1114	1214	4537
6	IPM technology	3	6	9	15	20	53
7	Information Technology Centre	264	24	24	24	24	360
	TOTAL	3036.4	2705.4	2908.4	3113.4	3218.4	14982