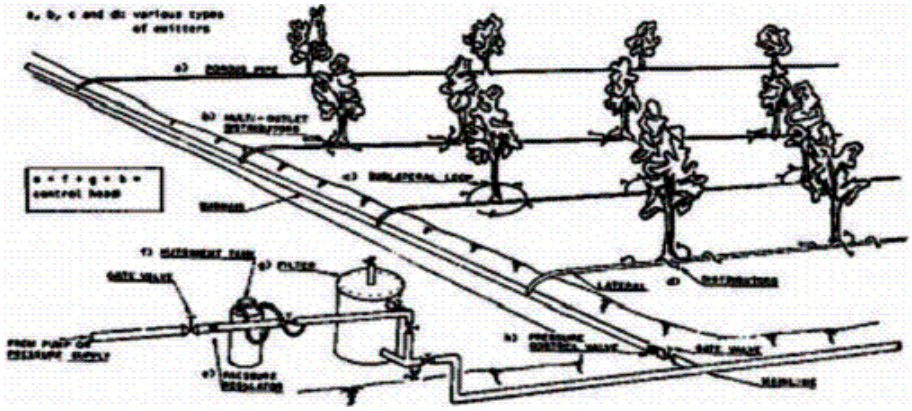
Drip Irrigation Litchi

PROJECT ON DRIP IRRIGATION SYSTEM FOR LITCHI CULTIVATION IN UTTARAKHAND



1.0 Introduction

The Uttarakhand State is strategically located and forms part of the Northern boundary of the country sharing its borders with Nepal in the East and Tibet (China) in the North, Himachal in the West and Northwest, Gangetic plains of UP in the South. It extends between 77o 43'and 81o 02'E Longitude and 28o 43' to 31o 27' N Latitude. Starting from the foothills in the South it extends to the snow clad mountains in the North. The elevation extends from approximately 300 to 7000 m above mean sea level. The highest peak is Nanda Devi (7817 m) in the Chamoli district. The entire State of Uttarakhand forms a part of the Central Himalayas. The State is interspersed with rivers, deep valleys, glaciers, Alpine meadows and high peaks; the state presents a very pristine, pure and picturesque environment.

In view of Uttarakhand's advantage as a major horticulture crops producing state, the state Govt.

has taken various steps to tap the resources for integrated development of horticulture sector ensuring nutritional security, utilization of wastelands and capture of foreign market. With a holistic approach to improve the quality and productivity of horticultural crops by integrated implementation of viable, eco-friendly, refined technologies, and the centrally sponsored scheme on Technology Mission for Integrated Development of Horticulture in Uttarakhand was launched on 16th December 2003 in the state.

The technology mission was focused to bring significant increase in production and productivity of horticultural crops through area expansion under various horticultural crops incorporated with creation of water sources to ensure availability of water for irrigation and launch modern and scientific systems of irrigation like Drip/Micro irrigation as water scarcity in hills and Bhabar areas of Uttarakhand is the major constraint which influence the crop yield badly.

As a policy to encourage use of such systems, the Govt. of India under centrally sponsored scheme for small and marginal farmers to increase the irrigation efficiency, provides subsidy to the extent of 50% of the cost of the equipment, the balance would be provided by banks as a bank loan.

Keeping in view the declaration of Litchi Export Zone in Uttarakhand the use of micro irrigation systems like drip has become all the more essential to improve the yield and quality of Litchi to compete with the world market. In this context, an attempt has been made to preparea ModelDrip Irrigation Scheme for cultivation of one hectare of Litchi in Uttarakhand State.

2.0 Present status of Litchi in Uttarakhand

Litchi chinesis is one of the most delicious, exquisite and nutritious summer season fruit which belongs to family Sapindaceae and thrives best in sub tropical conditions. It is a native of China and largely cultivated in the States of Uttarakhand, Bihar and West Bengal. The quality of Litchi grown is of very high order and as such has been selected under Agri Export Zone (AEZ) by the Govt. of India. Presently Uttarakhand has an area of 8370 ha under litchi cultivation and annual production is around 14352 T. There is large scope for further expansionof litchi cultivation particularly in Nainital, Udham Singh Nagar and Dehradun districts of Uttarakhand. With favourable agro-climatic conditions, assured market and promotion of export for litchi, this commodity has very bright future in Uttarakhand. Presently Litchi is grown in 65 blocks of the State.

3.0 Scheme Area

Litchi was initially confined to only three districts namely Dehradun, Nainital and U.S.Nagar. But now its area has expanded in many districts and as on 31.3.2007 cultivation has spread to many districts and the no. of blocks where Litchi is grown has increased to 65. Total area under litchi has gone up to 8370 ha.

4.0 Agro Climatic Aspects

4.1 Climate

Litchi thrives in mild weather condition with dry, frost free winters and long hot summerswith high humidity and rainfall **.**The climate of Tarai and Bhabar Regions of Uttarakhand is humid subtropical and is by and large congenial for the quality production of Litchi crop.

4.2 Soil

Litchi can be grown in all types of soil, but for good growth, well drained sandy loam alluvial soil with pH value of 5.5 to 7.5 with shallow water table is considered ideal for Litchi plantation. The soils of Bhabar and Tarai regions of Uttarakhand are suitable for promotion of Litchi cultivation.

4.3 Groundwater quality

Quality of groundwater in Uttarakhand is reported to be good and suitable for Litchi cultivation.

4.4 Availability of planting material in the litchi growing area

Sufficient planting material is available in the State Govt. nurseries, G.B.Pant University for Agriculture & Technology, Pantnagar and Private Nurseries.

5.0 Drip Irrigation for Cultivation of Litchi

Drip irrigation is the most efficient method of water management and is also known as "trickle" irrigation. Under this system, water is carried to the plant under low pressure, through small diameter plastic pipes and delivered at the root zone, drop by drop through drippers. Drip irrigation is a widely practiced and established method of irrigation in developed countries and gained popularity in India. It is most suited for fruit crops, vegetables etc. and its applicability in areas where groundwater/ surface water is scarce and helps in optimal use of the limited water resources.

The system has its advantages and limitations. Its advantages are in terms of savings of water (50-60%) when compared to the requirement through flow irrigation, effective use of fertilizers, less labour and energy cost. The limitation for adopting this method is its high initial cost, which is beyond the purchasing capacity of small and marginal farmers and thus mainly adopted by large farmers.

6.0 Initiatives by State and Central Govt.'s under Drip irrigation scheme

Subsidy is available under the Centrally Sponsored scheme upto 50% as per the Category of the farmer.Considering the importance of micro irrigation system like drip in conserving water and increasing the productivity, the bank should provide financial assistance to farmers for installation of drip system subject to techno-financial viability of the total investment.

7.0 Technical details

The technical detail of Drip Irrigation systems is given in **Appendix-II**.

8.0 Unit cost

The unit cost of drip irrigation system to be installed on a 1 ha plot of litchi garden is given in **Annexure-I**. The cost works out to Rs.42,000 per ha. and if pump is also required to be funded, total cost works out to Rs.62,000. This is in addition to the cost of cultivation of Litchi.

9.0 Techno –Economic parameters

The Techno –Economic parameters for working out the economics are furnished in**Annexure-II**.

10.0 Financial viability

Under drip irrigation system, Litchi comes to bearing from the fourth year onwards and the yield increased over the years and stabilizes in the eighth year. The financial analysis has been done with the above parameters of the investment cost and yields. The BCR and IRR works out to 2:1 & 28.25 % respectively. The scheme is financially viable. The viability of the scheme is worked out considering the cost of pumpset also. The BCR and IRR are 1.51:1 & 22.48% respectively. Sensitivity analysis shows that this scheme is also financially viable. The details are given in **Annexure III**.

11.0 Lending terms & Conditions

11.1 Margin Money :

The beneficiaries may contribute towards down payment/margin money ranging from 5 to 25% depending upon their category, i.e., small and other farmers in accordance with the NABARD's norms. Beneficiary's own labour can also be taken as his contribution towards the margin money requirement. In this model scheme, the beneficiary's down payment/margin money is considered

at 10% of the total project cost.

11.2 Security : As per RBI norms.

11.3 Interest Rate :

The rate of interest to be charged to the ultimate borrowers would be decided by the financing banks as per the RBI guidelines from time to time. However, for working out the financial viability and bankability of the model project, the rate of interest is assumed as 12%.

11.4 Repayment Period :

Three years gestation period can be considered while fixing the repayment period. The repayment of interest shall commence from the fourth year onwards. For model-**A** : Drip irrigation system, the repayment period of principal commence from eighth year and repayment shall complete in eleventh year. While for model-**B** : Drip irrigation system with pumpset, the repayment period of principal commence from ninth year and repayment shall complete in fourteenth year. The details are given in **Annexure IV**.

12.0 Conclusion

Litchi cultivation with drip irrigation is a financially viable proposition and banks may consider extending financial assistance for installation of drip irrigation system in both existing and new orchards.

Annexure -I

Estimated Cost of Drip Irrigation System on 1 ha Plot

SNo	Item	Quantity	Unit	Rate (Rs./m or no.)	Cost (Rs.)
1	PVC Mainline 62. 50 mm dia (4kgf/cm2)	100	m	48.59	4,859
2	PVC Lateral Line 50 mm dia (6kgf/cm2)	120	m	47.5	5,700
3	Drip Lateral line 16 mm dia (2.5 kgf/cm2)	1350	m	9	12,150
4	Lateral connectors	13	nos	15	195
5	Sub main flush valve 50x65 mm	2	nos	100	200
6	Gate valve	2	nos	750	1,500
7	Drippers (turbo key 4lph) -4 nos. per plant	832	nos	3.9	3,245
8	Micro tube (6mm.) @ 4 m per plant	832	m	2.5	2,080

9	Tees, end-plugs.			LS	1,500
10	Bypass assembly 1.5" x 1.5"	1	nos	1400	1,400
11	Disk Filter 15 m3/ hr.	1	nos	2300	2,300
12	Ventury manifold complete assemblly plastic 1.5"	1	nos	1700	1,700
13	Fitting and accessories			LS	2,500
14	Installation charges			LS	2,500
				Total	41,829
				Or say	**42,000**

Note :

Banks may consider financing storage tank and water source, subject to non-availability of the same with the beneficiary**.** Bank can also finance for pumpset costing Rs. 20000.

Annexure-II

Techno –Economic parameters of Litchi cultivation for 1 ha. (100 m x 100 m) :

A. Technical parameters

i. Plant spacing : 6 m x 8 m

ii. Total no. of plants : 208

iii. Water requirement (litres/day/plant) : 65

iv. Production starts from 4th year onwards.

v. Yield

(a) 4th year : 5.00 qts/ha.

(b) 5th year : 12.00 qts/ha.

(c) 6th year : 18.00 qts/ha.

(d) 7th year : 27.00 qts/ha.

(e) 8th year onwards : 35 qts/ha.

B. Financial Parameters

i. Cost of cultivation : Year-wise cost is given in**Annexure – III**.

ii. Maintenance/operating cost of Drip system :

(a) Rs.2000 per annum during 1 to 3 years

(b)Rs.2300 per annum during 4 to 15 years

iii. Average sale price at farm gate : Rs.15/kg.

iv. Margin money : 10% of the total cost.

v. Interest Rate : 12%.

vi. Repayment period : 11 to 14 years with 3 years grace period.

Appendix -I

Blockwise Area and Production of Litchi Crops in Uttrakhand State							
Sr. No	**Block**	**Lichi**		**Sr. No**	**Block**	**Litchi**	
		Area	Production			Area	Production
		(in Ha.)	**(in MT)**			**(in Ha.)**	**(in MT)**
Nainital				**Dehradun**			
1	Bhimtal	44	107	**34**	Doiwala	220	332
2	Okhalkanda	28	63	**35**	Raipur	1256	1806
3	Baitalghat	11	26	**36**	Sahaspur	622	949
4	Haldwani	65	160	**37**	Vikasnagar	1026	1559
5	Kotabag	566	1378	**38**	Kalshi	550	846
6	Ramnagar	399	978		**Dehradun Total**	**3674**	**5492**
	Nainital Total	**1113**	**2712**	**Pauri Garhwal**			
US NAGAR				**39**	Pauri	11	17
7	Khatima	80	90	**40**	Kot	9	14
8	Sitargunj	116	135	**41**	Kaljikhal	11	18
9	Rudrapur	351	400	**42**	Khirshu	14	22
10	Gadarpur	153	175	**43**	Poba	2	3
11	Bazpur	152	176	**44**	Akeshwar'	13	20
12	Kashipur	179	205	**45**	Pokhara	2	3
13	Juspur	65	74	**46**	Nainidoda	2	3
	US NAGAR Total	**1096**	**1255**	**47**	Raikanikhal	10	16
Almora				**48**	Yamkeshwar	12	19
14	Bhisiyachanna	13	0	**49**	Jaharikhal	5	8
15	Dholadevi	7	0	**50**	Duarikhal	5	8
16	Duarghat	15	0	**51**	Duggada	48	73
17	Chokhutiya	43	10		**Pauri Garhwal**	**144**	**224**

					Total		
18	Salt	40	10	**Tehri Garhwal**			
19	Bhikiyasain	73	25	**52**	Chamba	1	1
20	Seeyald	58	20	**53**	Narendranagar	3	1
21	Tadikhet	30	10	**54**	Toladhar	1	1
	Almora Total	**279**	**75**	**55**	Jakhinanagar	2	1
Pithoragarh				**56**	Kirtinagar	2	1
22	Chinna	28	27	**57**	Deveparyag	2	1
23	Munakot	65	57		**Tehri Garhwal Total**	**11**	**6**
24	Kanalichhina	49	43	**Rudraprayag**			
25	Dharchula	49	48	**58**	Augastmuni	17	5
26	Deedihaat	19	18	**59**	Ukhimath	1	0
27	Munsayari	65	63	**60**	Jakholi	6	0
28	Barinag	23	22		**Rudraprayag Total**	**24**	**5**
29	Gangolihat	49	48	**Haridwar**			
	Pithoragarh Total	**347**	**326**	**60**	Narsan	178	471
Champawat				**61**	Bhagwanpur	200	550
30	Champawat	221	404	**62**	Roorkee	160	441
31	Lohaghat	71	124	**63**	Bhadrabad	509	1404
32	Barakot	34	65	**64**	Laksar	148	411
33	Pati	28	18	**65**	Rampur	133	369
	Champawat Total	**354**	**611**		**Haridwar Total**	**1328**	**3646**
					State Total	**8370**	**14352**

Appendix : II

Technical details of Drip Irrigation systems

a. Design parameters

Scheme formulation for installation of drip irrigation system against bank loan requires both technical and financial details. The important items that should be included in a scheme for drip irrigation system are given bellow :

b. Command area

A command area map giving systems layout is necessary to plan and design a drip irrigation

system. It may not be necessary to have a detailed contour plan but it is helpful if a plan showing the highest and lowest points along with well location is given in the scheme. This enables proper design of main line and laterals to suit the spacing and number of plants.

The present scheme is prepared for application of drip irrigation on one hectare farm of Litchi.

c. Spacing and Plant Population of Litchi in one ha.

The spacing between plant to plant and row to row has been recommended as 6 m x 8 m respectively by the Horticulture department of G.B.Pant University for Agriculture & Technology, Uttarakhand. The No of plants required for cultivation of 1 ha litchi with above spacing would be 100m x 100m /6 m x 8 m = 208 plants. However, the plant spacing adopted by earlier farmers was planting at 8x8m to 12x12m.

d. Water requirement for litchi plants.

Water requirement for litchi crop (WR) is a function of surface area covered by plants, evaporation rate and infiltration capacity of soil. The irrigation water requirement for each plant has been calculated for each plant and thereafter for the whole plot of 1 ha based on plant population for the different seasons. The maximum discharge required during any one of the three seasons is adopted for design purposes.

The daily water requirement for fully grown plants can be calculated as under.

WR = **A** X **B** X **C** X **D** X **E** .....Equation (1)

Where :

WR = Water requirement (lpd /plant)

A = Open Pan evaporation (mm/day)

B = Pan factor (0.7)

C = Spacing of plant (m2)

D = Crop factor (factor depends on plant growth for fully grown plants = 1)

E = Wetted Area (0.3 for widely spaced crops)

The total water requirement of the farm plot would be **WR** x **No.of Plants**.

e. Estimation of Water Requirement

The irrigation water requirement is determined using IMD pan evaporation data. The average season wise pan evaporation data for the area is given below.

S.No.	Season	Days (Nos)	Total Pan (evaporation during the season (mm)	Avg. Daily Pan Evaporation (mm/day)
1	Kharif (15/6 to 15/10)	122	506.30	4.15
2	Rabi (16/10 to 15/4)	183	649.65	3.55
3	Summer (16/4 to 14/6)	60	408.00	6.45

The daily water requirement of plants using above equation has been worked out as under.

Sr.No	Season	Evaporation (mm/day)	Water requirement	
			Lpd /plant	M3/ day/ha
1	Kharif	4.15	41.83	8.31
2	Rabi	3.55	35.78	7.44
3	Summer	6.45	65.07	13.53

Therefore, the drip irrigation system has to be designed for the maximum requirement of 65.07 litre /day/plant during the summer season and for this the water required would be 13.53 m3/ day/ha of plantation. If the average working hour of pump set is taken as 4 hours per day, the discharge required would be as below :

Pumping rate per hectare = 13.53 m3 /day/ha = 3.38 m3 /hr/ha = 0.94 LPs or say 1 LPs. As required discharge is only 13.53 m3 /day/ha, it can be pumped for one hour only from a well giving a discharge of 5-6 lps. This is also the normal well yield in the scheme area using a 3-5 HP pump set. For the estimated water requirement of 1 lps only, an arrangement to divert excess water to irrigate other crops would be provided, especially during Kharif and Rabi periods. Alternatively, **a tank of 14 m3** capacity can be provided where necessary so that uninterrupted irrigation may continue even in areas where power shut down are frequent.

f. Selection of Emitters

Number of emitters

Depending upon the type of emitter and discharge required their number can be estimated. For a pressure head of 4m and discharge at 17.5 litre /hour the number of emitters required are:

No. of emitters/plant = Rate of Pumping/hour/plant /Avg. discharge of one emitter

= 13.53/4 = 3.38 or say 4 emitters/ plant

The plot is square and of 1 ha. As such the mainline would be 100 m long and laterals would also be 100 m in length. As plant spacing is 6m x 8m, a total of 13 laterals would be required. Each lateral would serve approximately 16 plants and there would be 4 emitters per plant. Thus, the total number of emitters per lateral would be 16x4 = 64 nos.
As the total length of one lateral is 100m the emitters would be spaced at 1.5 m i.e. 100/64.

g. Main Line

The main line is designed to carry the maximum discharge required for total number of plants in the farm plot.

Maximum discharge required = No. of plants x peak discharge per plant

= 208x 13.53 = 2814 lph =0.78 or say 1 LPs

h. Friction Head loss in Pipes (m)

Total length = 100.0

Equivalent length of 13 straight connectors = 6.5

Equivalent length of tee, bends etc = 5.5.

Total =112.0 m.

The value of coefficients has been taken from tables given below. It would be seen from table 1 that for a discharge of 1 LPs through a pipe of say 40 mm diameter, the friction loss would be 2 m per 100 length or 2.2 m for 112 m equivalent length.Friction Losses for Flow of Water (m/100m) in smooth Pipes(c=140)

i. Discharge Bore diameter(mm)

Discharge Bore diameter(mm)										
(lps)	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
0.5	16.4	5.5	1.6	0.56	-	-	-	-	-	-
1	**-**	**10**	**6**	**2**	**0.68**	-	-	-	-	-
1.5	-	-	12.7	4.3	1.45	0.4	-	-	-	-
2	-	-	16	7.3	2.5	0.68	0.25	-	-	-
3	-	-	-	15.5	5.2	1.45	0.53	-	-	-
4	-	-	-	26.4	6.9	2.5	0.9	0.3	-	-
5	-	-	-	-	13.4	3.8	1.36	0.46	-	-
6	-	-	-	-	18.8	5.2	1.9	0.64	0.22	-
7	-	-	-	-	-	6.9	2.5	0.84	0.29	-
8	-	-	-	-	-	8.9	3.2	1.1	0.37	0.15
9	-	-	-	-	-	11.1	4	1.36	0.46	0.19
10	-	-	-	-	-	13.4	4.9	1.65	0.55	0.32

For other type of pipes (new) multiply foregoing figures by factor given below
Friction head loss = 2.2 x 0.88 = 1.94 or say 2.0
Conversion factor = (0.88)

As the proposed system uses multiple openings, the friction loss is taken as 1/3 of the total friction loss i.e. 2.0/3 i.e. 0.66 m. Thus, the loss in mains is within 1.0 m/100 m and a pipe of 40 mm diameter is ideal in the layout.

j. Laterals

A lateral is so selected that the pressure difference from the proximate end to the last emitter do not exceed 10% of the normal operating head which in the present case is 4m. The maximum permissible variation in friction loss in the pipe is 4x10/100 = 0.4 m for a lateral of 100 m length. The land slope is 0.5 m/ 100m. Thus the total friction loss allowable is 0.4 + 0.5 = 0.9 m.

In addition to 100 m length of laterals there is additional loss due to connectors. This is generally taken as 0.1 to 1m (on an average 0.5) of the equivalent length of an emitter. The equivalent length of 64 emitters would thus be 64x0.5 = 32 m. Thus, total equivalent length for calculation of friction loss in laterals would be 132 m (100+32). The total flow in laterals is 256 lph i.e. 4 x 4 x16. It may be seen from Table No 4 that for 200 LPs flow the friction loss in 13.9 m length would be 2.25 m. It is a general practice that friction losses are taken at 1/3 of the total equivalent length of pipes with multiple emitter/connections. Thus, the friction loss works out to 1/3 x 2.25 = 0.75 m which is within the maximum permissible limit of 0.9 m. Therefore, 14 mm (outer dia) lateral pipe of 100 m length is suggested in this scheme.

The friction loss in micro tubes need not be considered as a minimum of 4m head is prescribed

which includes friction loss.

Friction Head Loss in M per 100m. PipeLength

Flow Inside diameter (mm)							
	9.2	11.7	12.7	**13.9**	15.8	18.0	19.0
(lph)	Head loss in m per 100 m length of pipe						
200	10.2	5.2	2.5	1.7	0.8	0.4	0.3
400	39.0	18.0	8.6	5.7	2.7	1.6	1.1
600	--	39.0	18.0	13.0	5.9	3.2	2.5
800	--	--	30.0	21.0	10.0	5.5	4.1
1,000	--	--	45.0	30.0	16	8.3	6.2
1,200	--	--	--	42.0	21.0	11.0	8.8
1,400	--	--	--	56.0	28.0	16.0	11.0
1,600	--	--	--	--	36.0	20.0	15.0
1,800	--	--	--	--	45.0	25	19.0
2,000	--	--	--	--	54.0	30.0	23.0

k. HP of Pump set

The HP of pump set required is based upon design discharge and total operating head. The total head is the sum of total static head and friction losses in the system.

(i)Static Head.

The total static head is the sum total of the following (m).

Depth to water (bgl)	16 m (assumed)
Draw down	3 m (assumed)
Height of Delivery pipe (agl)	1 m
Friction loss in pipes, bends, foot valves etc.	2.25m
Total	**22.25 m**

(ii)The friction loss in the drip unit as under (m)

Friction loss in main pipe	2.2 m
Friction loss in laterals	0.75 m
Minimum head required over emitters	4.0 m
Total	**6.95 m**

Total Head = Static Head + Friction head loss = 22.25 + 6.95 = **29.20 m or say 30 m**

The required HP of the pumpset has been calculated as per the following formula.

Hp of pump set = Q x H/ 75 x e

Where Q = discharge (lps)

H = Head (m)

e = Pumping efficiency (o.6)

HP = 1x30 /75x.6 = 0.66 or say 1 HP

Appendix - III

CHECK LIST

MINOR IRRIGATION - DRIP IRRIGATION

(To be completed by the Executive/Officer of the bank forwarding the scheme)

NOTE : Tick (/) across the line to signify that the relevant information has been furnished in the scheme.

GENERAL

- Specifications of the scheme area
- Nature and objective proposed development
- Name(s) of the financing bank(s) / branch(s)
- Approval of the schemes by the competent authority, including State Government in the case of SLDB. Coverage of the loans under the Guarantee Schemes of Deposit Insurance and Credit Guarantee Corporation
- Status of beneficiaries (individuals/partnership firms/company/Corporation/Co-operative Society) and the coverage of borrowers in weaker sections like small (as per norms given by National Bank) or marginal farmers/SC/ST, etc.
- Land-use pattern, source-wise irrigated area, present cropping pattern, yield and income per acre, land holding distribution, land tenure system etc. in scheme area
- Capability/experience of the persons/institutions implementing the scheme
- **TECHNICAL ASPECTS**

- Command area map with levels
- Type of soil
- IMD Normal Annual Rainfall
- IMD Monthly Evaporation
- Proposed cropping pattern with plant spacing and number of plants per hectare for a modal farm
- Peak water requirements per plant/day and per plant/season
- Designed discharge and water availability in hours per day
- Existing pumping equipment
    i. Range of HP
    ii. Whether electric/diesel
- Water availability
    i. Geology of the area
    ii. Category of block
    iii. Chemical quality of water
    iv. Design of well (dia/Depth)
    v. Well discharge
- Design of Drip system for a model
    i. Main line
    ii. Sub main
    iii. Laterals
    iv. Emitters/Micro tubes
    v. Lateral/Straight connector
    vi. Fertilizer unit

vii. Bends/end plugs, joints etc.

viii. Pressure gauge, water m

ix. Water regulators

x. Item-wise break-up of unit cost

xi. Comments on technical feasibility of the project

- FINANCIAL ASPECTS
- Lending terms : rate of interest, grace period, repayment period, down payment, nature of security, availability of Government guarantee for bank loan/refinance (if necessary), source and extent of availability of subsidy etc.
- Year-wise physical and financial programme, bank loan and refinance requirement
- Income "without project and "with project" with reference to the representative of the holdings in the scheme area and the estimate of incremental income
- Comments on the financial viability of the project along with cash flow, BC Ration, net present worth, financial rate of return (IRR) etc.
- Comments on the financial position of the borrowers/implementing agency. In the case of partnership firms/companies/Corporation or Society an analysis of their financial position, debt-equity ratio and profitability along with copies of audited financial statements for the last three years.
- INFRA STRUCTURAL FACILITIES
- Sources of availability of capital assets/drip irrigation system, the approximate distance and arrangements for their maintenance/servicing
- Arrangements for availability of raw-material, improved seeds/fertilizers, pesticides, etc., for agriculture
- Agencies providing crop loans/maintenance expenses to the beneficiaries and the adequacy of the arrangements.
- Availability of technical staff for implementation of the scheme with the bank/implementing authority.
- Details of technical guidance, government support/extension service available and whether budgetary provision has been made for the same.

- Supervision and monitoring arrangements available with the financing institution.
- Availability of power and diesel.

Signature and Designation of the Bank Officer

Annexure IV