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Investigations on the feasibility of cultivation in draw down areas of Almatti reservoir

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ABSTRACT

The cultivation in the draw down areas of irrigation projects is an age old practice but making use of these areas judiciously for sustained and economical crop production is of prime importance. Considering the non-availability of research findings for cultivation of these draw down areas, a transact survey was carried out to interact with the concerned farmers (land owners) in Almatti reservoir (Upper Krishna Project (UKP) Karnataka state). Based on this we came out with a few recommendations to practice cultivation of improved varieties of short duration crops like fodder jowar, fodder bajra, fodder cow pea, cow pea, green gram and vegetables like methi, amaranthus, coriander and cucumber in these draw down areas depending on the soil moisture availability periods. Besides, certain fruit and tree species like tamarind, sapota, casuarina and silveroak were also recommended for planting near the periphery of full storage of the reservoir in order to check the soil erosion and its deposition in the reservoir from the cultivated lands situated on the upper ridges.

Key words : Draw down area, Almatti reservoir

INTRODUCTION

The Almatti reservoir which is mainly meant for storage of water has its draw down from first week of January in the farthest areas to the last week of February in the areas nearer to the dam. The effective moisture availability for crop growth in these areas varies from 30-60 days depending on the soil type. The survey of representative villages on the banks of Krishna and Ghataprabha rivers revealed that the farmers are using these lands for the cultivation of crops like groundnut, green gram, cow pea, sunflower, maize, field bean, sorghum, cucumber etc., by providing protective irrigation from the bore wells and lift irrigation facilities available during summer season. Although the protective irrigation was provided, the performance of most of these crops was not satisfactory. Further in the years to come due to the proposed disconnection of presently available power supply, the prevailing protective irrigation facility may not be possible. On completion of Almatti reservoir project, approximately 75,600 acres of fertile land in Bagalkot, Bijapur and Belgaum districts has been submerged. During the summer months, the water in the reservoir receds exposing the submerged area for the period of two to five months. Hence, there is a possibility of cultivation of short duration crops by utilizing residual moisture in the draw down areas.

MATERIALS AND METHODS

An elaborative survey was conducted in draw down areas of Almatti reservoir comprising four villages with the following objectives (1) To identify the suitable cropping patterns and their management for the draw down areas of Almatti reservoir (2) To work out the economics of draw down cultivation with different crops.

A thorough discussion was held about the draw down area cultivation with the Commissioner and farmers of Bagalkot during May 2001. It was emphasized by the Commissioner that the draw down area should be utilized in a proper way by indicating suitable crops and their management by making survey of representative villages in the basins of Krishna and Ghataprabha rivers. Depending on the distance from the dam and soil types, the villages namely Dhavaleshwar, Herkal, Gani and Kolhar were selected. Along with Land Acquisition Officer and Sociologist of UKP we visited river banks of each villages in the month of May 2001. The team transacted in the draw down areas making notes on soil type and condition, existing crops and their condition. And also collected soil and water samples from that area. During the transact, the team met some of the farmers who were working in their fields. The meetings of farmers were arranged in the respective villages in the evening for discussion regarding cultivation in draw down areas. The information collected during transact was confirmed through Participatory Rural Appraisal (PRA) technique (Ajaykumar Sah *et al.,* 2004).

Village wise situation analysis:

Dhavaleshwar:

The village is located on the right bank of Krishna where the river water starts receding from second week of January and earliest sowing can take place after 15-20 days. The soils are deep black and the moisture is

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available for a period of 45-60 days for better crop growth. The crops cultivated in drawn down areas were groundnut, maize, sunflower, cucumber, onion and chilli with protective irrigation as lift irrigation was functional and this may not exist in the succeeding years. The crops like cow pea, green gram and avare were grown with residual moisture. Most of the holdings lie in narrow strips perpendicular to the river and inconvenient for sowing. The indigenous grasses like sirkabbi and marvel which were grown naturally have vanished due to continuous submergence resulting in shortage of fodder for live stock. The submergence has also severely affected horticultural trees like mango, guava and coconut due to lack of aeration to roots, leading to complete wilting.

Herkal:

This village is situated on Ghataprabha left bank. The river water starts receding from January onwards and first sowing can only take place after 10-15 days. The soils nearer to the river are black and soils in the upper ridges are mixed black and red and red. The moisture is available for a period of 30-45 days for better crop growth. The approximate percentage of area under different crops was 25 per cent green gram, 20 per cent cow pea and avare (Dolichos bean) each, 15 per cent sunflower and 15 per cent groundnut with protective irrigation from bore wells and remaining 25 per cent land was uncultivated. The majority of uncultivated land constituted red soil where moisture availability was only for lesser period. The green gram, cowpea and avare grown on residual moisture in black soils had poor stand due to late sowing *i.e.*, in March. Under irrigated conditions, the performance of groundnut with respect to pod production was poor due to excess application of nitrogen. In the uncultivated draw down area, the new un identified two weed species were grown.

Gani:

This village is situated on the left bank of Krishna river very near to the dam. The water starts receding from February 15th to March first week and the first sowing can take place after 10 to 15 days. The draw down area is not flat and has many ups and downs. The soils all along the river bank are black and towards upper ridge, soils are red and red and black mixed. The moisture available for effective crop growth is around 30 to 45 days. The crops grown in the draw down areas were *rabi* jowar for fodder, sunflower, green gram, avare, cow pea and cucumber. Since, the crops were sown very late the crop growth was not satisfactory. Due to submergence the original grasses have vanished. The area under cultivation was around 20 per cent as farmers have shifted to rehabilitation centre seven years ago which is far off (6km from the village). Further, the non-availability of approach road has caused inconvenience to the farmers.

Kolhar:

The village is located on the Krishna left bank. The soils are black towards the river and red mixed on the upper ridge. The water starts receding from first week of January and continues up to March. First sowing can take place 15-20 days after the receding of water. The moisture available for crop growth was about 45 days. The crops cultivated were groundnut, cow pea, green gram, avare, sunflower and onion with irrigation from bore wells and lift irrigation. Wherever the crops grown only on residual moisture, the growth was not satisfactory and in many cases crops were harvested for fodder purpose only. In groundnut only few pods were observed due to profuse vegetative growth. The major indigenous grasses grown in the river bank have vanished due to submergence. Because of submergence of soil continuously, physical properties like soil porosity, water stable aggregates, bulk density have been affected adversely and resulted in lower yields, though the soils were fertile. The water in the open wells of submerged area has turned saline and making it unfit for drinking and irrigation.

Problems expressed by the farmers:

Non availability of sufficient soil moisture during later part of crop growth resulting in lower yield Other than this are menace of stray cattle, birds and pigs, adverse effect on soil properties and salinity in the open well water due to continuous submergence, delayed sowing due to late receding of water in the villages nearer to the dam (Gani and Herkal), lack of approach roads to draw down area in Gani and Kolhar villages and marketing of perishable produce like vegetables.

Perception of the farmers towards cultivation of draw down area:

In all the four villages surveyed, majority of the farmers feel that the cultivation of drawn down area was uneconomical due to the reasons *viz*., delayed sowing due to late receding of water, particularly in the villages which are located near to the reservoir. The farmers who lost their complete land in draw down area and others having part of the land in the upper ridge are not interested in the draw down area cultivation. However, some of the farmers in Herkal village were of the opinion that draw down area can be cultivated successfully by utilizing the

irrigation source available in the upper ridges.

RESULTS AND DISCUSSION

Soil and water analysis:

The representative soil samples collected were analyzed for certain properties (Table 1).

Dhavaleshwar:

Soils were clay in texture, neutral to alkaline in reaction (pH – 7.49) and slightly saline. Organic carbon content of the soil was in the medium range indicating good soil fertility.

Table 1 : Soil type, pH, EC (dS/m) and organic carbon content in soil samples of different villages

Village	Soil type	pH (1:2)	EC (dS/m) (1:2)	Organic carbon content (%)
Dhavaleshwar	Black clay	7.49	1.10	0.72
Herkal	Red	7.65	1.10	0.60
	Mixed (Red and black)	7.87	1.14	0.68
Gani	Sandy	7.75	1.40	0.60
Kolhar	Deep black	7.76	2.20	0.90

Herkal:

Red and mixed black and red soils were neutral in reaction, slightly saline and medium in organic carbon content. Soils were moderately fertile. The moisture availability period for crop grown was less because of their light texture.

Gani:

Soils were sandy in texture, neutral to alkaline in reaction. The organic carbon content is low indicating the low fertility status of soil. The soils were shallow. There was a little scope for cultivation of field crops profitably on these soils as they are less fertile and shallow.

Kolhar:

Soils were deep, clay in texture, neutral to alkaline in reaction, moderately saline and high in organic carbon content. The soils, in general, were fertile, suitable for cultivation of crops profitably depending upon the period of moisture availability for the crops.

Farmers opined that open well water had turned saline due to submergence. A water sample collected from such open well was found to be highly saline (EC=6.90 dS/m). Therefore, it cannot be used for protective irrigation purpose.

Table 2: Suggested field crops and cultivation practices for draw down cultivation

Suitable crops	Duration (in days)	Recommended variety (ies)	Time of sowing	Seed rate (kg/ha)	Fertilizer NPK (kg/ha)	Row spacing (cm)	Harvesting time
Fodder sorghum (*Sorghum bicolor*)	70	Kshirasagar (DFJ-1) J Set-3	Jan-15–Feb-15	22	50:30:20	37.5-45	Flowering
Fodder bajra (*Pennisetum typhoideum*)	50	Deenbandu (DFB-1)	Jan-15–Feb-15	9	30:20:10	37.5-45	Ear head emergence
Fodder cowpea (*Vigna unguiculata*)	60	Swad (DFC-1)	Jan-15–Mar-15	30	7.5:15:0	37.5-45	Pod setting (filling)
Grain cowpea (*Vigna unguiculata*)	70	S-488	Jan-15–Mar-15	18	6:12:6	45	Grain maturity
Green gram (Vigna mungo)	65	Chinamung, Pusa baisaki	Jan-15–Mar-15	11	6:12:0	45	Grain maturity

Table 3 : Economics of proposed fodder and grain crops in draw down area of Almatti reservoir of Upper Krishna project

Crops	Yield (t/ha)	Gross returns (Rs/ha)	Cost of production (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Fodder jowar	12	3000	2108	892	1.32
Fodder bajra	10	2250	1440	810	1.46
Fodder cowpea	09	2250	1350	900	1.43
Grain cowpea	0.2	2000	1461	730	1.41
Greengram	0.2	2400	1506	1074	1.49

GR: Gross returns, NR: Net returns, B:C: Benefit cost ratio

Table 4: Suggested vegetable crops and cultivation practices for draw down areas

Suitable crops	Duration (days)	Recommended (Varieties)	Seed rate (kg/ha)	NPK kg/ha	Yield kg/ha
Coriander (for leaf) (*Coriandrum sativum*)	40-45	Local	5-6	10:10:10	1000
Amaranthus (*Amaranthus sps.*)	25-30	Local	1.25	30:15:15	4000
Methi (*Trigonella faenumgraecum*)	25-30	Pusa early bunching	20	30:15:0	2000
Cucumber (*Cucumis sativus*)	Picking of fruits will commence from 40 days onwards	Local	1.25	18:15:24	2500
Cowpea (*Vigna uniguiculata*)	Early picking are possible for vegetable purpose	S-288, Pusa barasati	7.5	7.5:22.5:18	2500

Table 5: Economics of proposed vegetable crops in draw down area of Almatti reservoir of Upper Krishna Project

Suitable crops	Yield (q/ha)	Gross return (Rs/ha)	Cost of production (Rs/ha)	Net return (Rs/ha)	B:C ratio
Coriander (for leaf) (*Coriandrum sativum*)	10	3000	1817	1183	1.65
Amaranthus (*Amaranthus sps.*)	40	4000	2508	1494	1.60
Methi (*Trigonella faenumgraecum*)	20	4000	2296	1704	1.74
Cucumber (*Cucumis sativus*)	25	3750	2200	1550	1.70
Cowpea (*Vigna uniguiculata*)	25	3750	2160	1590	1.74

Cost of production was worked out based on prevailing cost of land preparation, labours, seed and fertilizer.
Gross return was worked out based on prevailing market values of produce.

Suggested field, vegetable and perennial crops and management practices:

Recommendations for cultivation under draw down area are not available, but based on the experiences of the scientists and views of farmers and considering the moisture availability period during summer, the following suggestions have been made. If the water recedes early (January first week) the fodder sorghum, fodder bajra, and grain cow pea could be grown. If water recedes late (February 2nd fortnight) fodder cow pea and green gram could be preferred. Agronomic practices to be carried out are adoption of wider row spacing and maintenance of optimum seed rate, seed hardening *i.e.*, soaking seeds of fodder sorghum and fodder bajra in water for 8 – 10 hours (over night). Overnight seed soaking in water helps in early and uniform germination. For better germination, early vigour and to overcome terminal stress seeds should be dried under shade after soaking in 2 per cent $CaCl_2$ solution for 6 – 8 hours. Soil moisture stress and high temperatures may effect the crop yield and quality of vegetables. At the periphery, which is the starting point of draw down area, some fruit crops like tamarind, sapota and some forest species like casuarina, silveroak could be planted in order to check the soil erosion from upper ridge during heavy rainfall. In certain areas where water logging condition is observed, the same could be rectified by bio-reclamation through the tree species like bamboo, *Pongamia glabra*, *Eucalyptus hybrid* and *Acacia nilotica* (c), this will also helps to realize additional income. (Anonymous, 2007)

Researchable issues and Extension needs:

– Information generation on management of crops in draw down areas by conducting experiments and demonstrations.

– Study of soil physiochemical and biological properties over years.

– Evaluation of perennial crops all along the starting point of draw down area.

– Creating awareness among the farmers to adopt scientific methods of cultivation.

– Arranging visits of farmers to other drawn down area.

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