INTENSIVE agriculture

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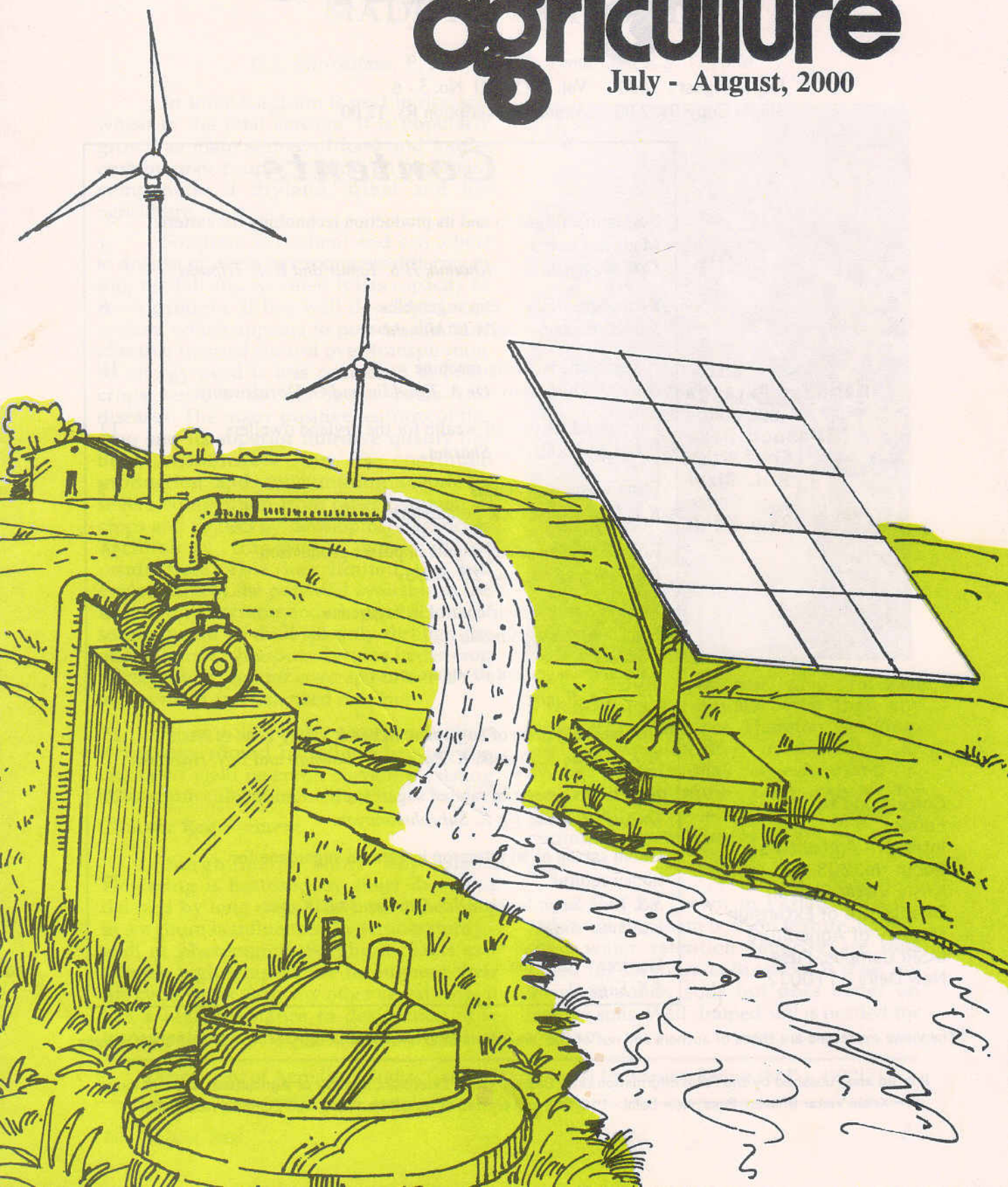

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FARM POND : A WELL OF WEALTH FOR THE DRYLAND DWELLERS

R.K. Goyal and A.K. Sharma

Water is a scarce commodity in drylands of India which presently occupy nearly 75 per cent of total cultivated area of 143 Mha. The quantity of water available from different sources such as surface water and ground water is not sufficient even for drinking purpose in this region. Over and above insufficient quantity, increasing population coupled wih rapid industrialization has further aggravated the problem of water scarcity. Under such circumstances it has become imperative to use all available water resources efficiently.

The farming community in this region by and large, resides in scattered settlement (Dhanis) where sand dune, interdunal plains and undulating sandy plains are the dominant land forms. Under such circumstances it is inconceivable that organized water supply scheme will be a feasible proposition to fully meet the irrigation, domestic and livestock water requirements. Therefore, in this region traditional technique of rainwater harvesting by farm ponds ('Tankas' in local parlance) is the only mode of meeting daily needs of water for the desert dwellers.

Tanka : A Traditional Source of Survival

Water harvesting by means of farm ponds is used to even out the variation in rainfall supply by storing water for the period when supply is limited. Farm ponds of safe economic design to harvest surplus run-off has, thus assumed greater importance.

Traditional methods of rainwater harvesting ranges from domestic use to supplemental irrigation for rainfed crops to support the settled life. It has, however been always integrated within a flexible multiple option strategies of resource use. According to individual's economic conditions people have evolved their own method for tanka construction. Due to research and developmental efforts of Central Arid Zone Research Institute practically every *dhanis* in this region now has one or more improved tankas mainly for domestic, livestock and life saving irrigation purposes.

Design of Farm pond: Traditional Vs Improved

Traditional design of tanka has many drawbacks like inadequate capacity to supply water round the year, loss of water due to seepage and evaporation, frequent sedimentation and sometimes unhygienic storage. With a view to improve economy in construction and reducing the evaporation losses, the tankas should be constructed to a sufficient depth as is compatible with the local soil conditions. Capacity of farm pond should be decided on the basis of total requirement of water for purposes.

An allowance of 20 per cent must always be given to pond capacity towards losses. The size of catchment selected, should produce adequate run-off to meet the storage requirements. The shape of tankas is generally taken circular or rectangular. However, circular shape is most preferred as it is economical and is found to be more stable as the pressure exerted by water is uniform radial pressure in the diametrical plane at the right angle to the curved surface. Regular cleaning of tanka and ramming of its catchment is must for keeping tanka in good condition. In areas where a considerable amount of silt is carried by inflowing water, preventive measures such as silt traps must be made at the inlet of structure to reduce silt deposition. Farm ponds must have

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Table 1 Economics of farm pond construction for desert dwellers (in Rs.)

Option	System	1 Year	II year	III year	Total
A	Ber + Nursery	0.0 + 6600	0.0 + 6600	12000 + 6600	31800
B	Nursery	11000	11000	11000	33000

A model of economic viability

1. Hydrology

Average expected annual rainfall	: 250 mm
Minimum run-off coefficient for artificial rammed catchment	: 0.20
Designed farm pond capacity	: 50 m^3
Minimum catchment area required	: 1000 m^2 or : 0.10 ha
Construction cost of uncovered pond based on 1993 BSR	: Rs. 30000

2. Water requirement

A. For raising Ber plants

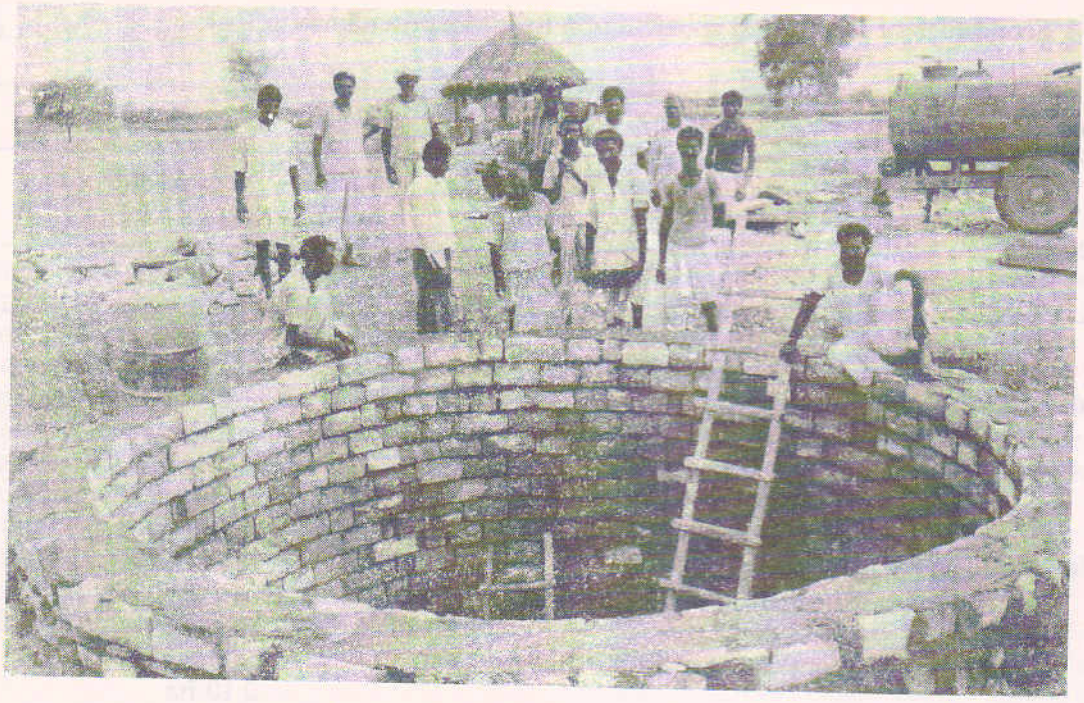
a. Water requirement of one plant	: 20 lit./irrigation
b. No. of irrigation/month	: 2
c. No. of months require irrigation	: 5
d. Water requirement per plant during the season	: 200 lit

B. For raising Ber nursery

a. Water requirement of one nursery seedling	: 0.10 lit./irrigation
b. No. of irrigation/month	: 5
c. No. of months require irrigation	: 3
d. Water requirement per seedling	: 1.5 lit.

3. Irrigation capacity and returns

No. of Ber + Nursery plants can be irrigated	: 200 Ber plants + : 3000 nursery seedling
No. of nursery seedling alone can be irrigated	: 5000
Net returns from one Ber plant (from third year onward	: Rs. 60 (10 kg $plant^{-1}$ @ Rs. 6 kg^{-1})
Net returns from one nursery seedling (every year)	: Rs. 2.2 $seedling^{-1}$



provision for carrying excess run-off when the pond is full.

People Participation

Tanka construction in Indian arid zone is centuries old system. The tanka system has been a self sufficient unit where people enjoyed an almost contended life. Over a period of time a general decline in people's participation spirit was observed. Therefore, in recent years a need was felt to involve people in planning, development and monitoring process. Participation means taking part in a process with a view to determine or at least influence the outcome of the process. Keeping these issues in mind seven improved farm ponds of 50 m^3 capacity were constructed in an experiment at Kalyanpur (Distt. Barmer) under National Wasteland Development Project. To ensure proper use of stored water and afterwards maintenance of tankas farmers participation was sought by way of their involvement in selection of site, type of pond and in construction process (Photo 1). Beneficiary farmers were asked to contribute 40 per cent of the cost of farm ponds in the form of labour for earch work and masonary work required for the farm ponds. Since the farmers' active participation was sought right from the initial stage it is envisaged that with proper maintenance of these ponds will be a very profitable venture and will last long.

A Well of Wealth for Generations

For efficient utilization of harvested rainwater for production purposes, selection of suitable tree/crop species is very important. Ber (Zizyphus mauritiana) plant is found growing naturally almost everywhere in this region. This tree plays a vital role in desert economy. Being a deciduous plant it sheds leaves after spring season and goes into dormancy stage. Thus no water is required during the hot months i. e. Feb. to June. Its dried leaves are eaten by goats. Being xerophytic in nature this plant can withstand extreme vagaries of the nature. Early maturing varieties ot the plants i. e. Seb,Gika, Mundia matures latest by the 1st week of March and gives higher fruit yield. For the farmers who are poor and have small land holding this plant in initial years provides assured minimum income. Once the farmer sterngthen his economic base over a period of 4-5 years he can switch over to some other high income generating trees/crops.In an experiment at village Kalyanpur(Distt. Barmer) under 250 mm

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Table - 1 : Diseases and pests of sugarcane in Barak Valley Zone

Location		Diseases		Pests	
District	Area	Major	Minor	Major	Minor
Cachar	Rajabazar Motinagar Palanghat	Red rot Wilt	Eyespot Ringpot	Early shoot borer Top borer Plassy borer Termite	Mealy bug White grub
Karimganj	Ratabari Ramkrishna Nagar Vereibond	Red rot Wilt	Ringspot Smut	Early shoot borer Top borer Plassy borer Termite	Mealy bug White grub
Hailakandi	Lakhi Nagar Ainakhal	Red rot Wilt	Ringspot Eyespot	Early shoot borer Top borer Plassy borer Termite	White grub Thrips

From the above study it is clear that almost all major diseases and pests of sugarcane are also found in Barak Valley Zone. So for improving productivity of sugarcane it is very much important to conduct farmer participatory research, extension campaign and training programme particularly on integrated diseases and pests management system, that may help the farmers to know about the plant protection measures of sugarcane. (IA)

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average annual rainfall and given set of soil and climatic conditions average 0.10 ha area were left as catchment area for minimum run- off coefficient of 0. 20.i.e 20 per cent of total rainfall. Zizyphus mauritiana plants were provided 2-3 supplemental irrigations (20 litre each) per month during establishment stage using harvested water manually by the farmers. With the existing capacity of farm pond about 200 Ber plants plus 3000 nursery seedlings of Ber or 5000 nursery seedlings of Ber alone can be irrigated. The cost of the farm pond and economics of different uses of harvested water is presented in table 1.

Observations on total run- off, cost of pond construction shows that water harvesting from micro- catchment and small scale plantation or nursrey raising in adjoining area could be a profitable and sustainable venture for the farmers even in exermely low rainfall situations. It is clear from the table 1 that construction cost of the farm pond can be recovered in just three years and farmer will have a permanent asset for three gereations.

The field experience of farm ponds at village Kalyanpur clearly indicates that in order to impart stability in agricultural production and meeting daily needs of desert dwellers, farm pond seems to hold the key.

Hence, it can be concluded that rainwater harvesting in the form of tankas hold great promise in areas characterised by low and erratic rainfall as a source of drinking water and life saving device for the rainfed crops. (IA)