

Elevated lined water storage tank

for integrated farming system

Deepak Hari Ranade¹ and M L Jadao²

All India Coordinated research Project on Dryland Agriculture, RVSKVV Campus,
College of Agriculture, Indore, Madhya Pradesh 452 001

The development and adoption of integrated farming system requires a lot of patience and water management for sustenance. Thus, with the utilization of all technological and hydrological options available for proper rainwater management and storage of sufficient water either through runoff, groundwater or with conjunctive use of ground and surface, it would be possible to develop an integrated farming system (IFS) with the inclusion of multiple crops and multiple enterprises.

Key words: Elevated water storage tank, Integrated Farming system, Uncontrolled run off, Water harvesting

AS per the requirement of AICRP on Dryland Agriculture, College of Agriculture, Indore, a team of scientists visited different villages to make the preliminary survey on the integrated farming systems adopted by the farmers of the region during April- June 2018. While visiting village Harsola, Mhow district, Indore (N 22° 34.224', E 75° 48.91', 534 m elevation) the team came across a farmer Mr Lokendra Rajput who shared his experiences on the farming situations and constraints faced by him. He also narrated about the steps taken and agricultural

practices carried out by him and how he was motivated to make his farming into a profitable business by adopting improved water management technologies. His experiences are worth sharing and thus can motivates others for its wide scale adoptability and enhancing the crop diversification and ultimately increase the crop intensity. The success story of the farmer also indicates that the watershed programmes and watershed development activities undertaken through village panchayat can improve the farming situation

through participatory approach.

Mr Lokendra Rajput is involved actively in his farming since 1995 and his combined family owns about 10 ha cultivated fields. The village is a part of Chambal river catchment, as most the of fields have shallow to medium deep

black soils underlain by basaltic murrum and hard stones with moderate slope in the range of 1 to 2% due to the topographical situation of the village. Various types of erosion created problems in his field like development of washes, small gullies and fragmentation of his fields. The uncontrolled runoff developed serpentine shape gullies on two sides of his field, makes the cultivation difficult in the cultivated fields. High amount of uncontrolled runoff water also developed deep gully (20 m wide and irregular shaped with varying depths) nearby his fields in a stretch of 500 m on one side and a relatively smaller gully of size 10 m wide and 200 m length with irregular shaped with varying depths on other side. These two gullies used to drain off the water very quickly without providing any help for groundwater recharge.

Normally he cultivates soybean, maize during *kharif* and chickpea and potato in part during *rabi*. He has an open well which no longer provides irrigation water because of over exploitation of groundwater and lowering of table. Thus, to provide irrigation particularly in *rabi*, he dug up 11 tubewells from time to time at



Fig. 1. Stop dam in gully where Sunken pond was created

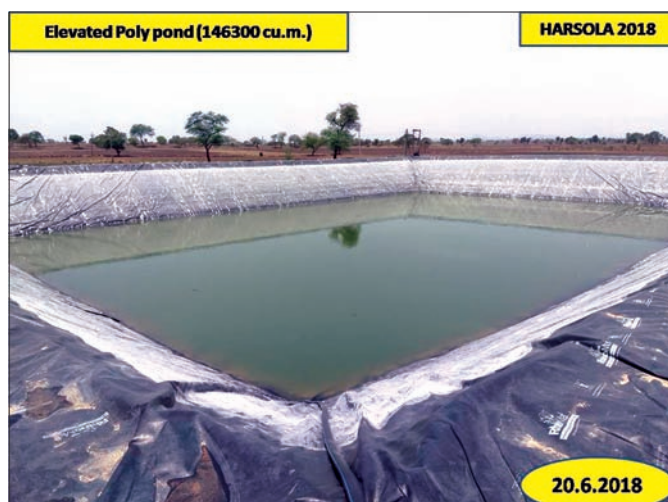


Fig. 2. Elevated water storage tank.



Fig. 2.b. Siphoning from storage tank to open well

different locations. In spite of that, all the tubewells provide water only till the end of Decemebr and suddenly dry up and thus unable to provide irrigation during critical stages for *rabi* crops, thereby hampering the chances of producing satisfactory crop production. Thus, the scarcity of irrigation water was his major constraint and concern for the existing farming system. Therefore, in 2015, he started actively to enhance water availability through proper rainwater management.

Though initially during 2003, he tried to store the runoff water in the deep and wide gully by *bori bandhan* (sack dam) across the gully to enhance the groundwater recharge and thereby rejuvenating the open well. However, due to high runoff volume and velocity, the sack dam broke away within 10 days of monsoon arrival in the very first year of its provision. It is worth to mention here that *bori banchan* is a temporary structure and suitable only for handing runoff in very small gully and lasts only for one season. Since, the site was not suitable, the temporary structure could not serve the purpose of reclaiming gully and storing and arresting runoff water during monsoon season.

Then he contacted the local Panchayat Sarpanch Mrs Laxmi Vishnu Malviya and watershed team and got constructed cemented stop dams (Fig. 1) in three series in this 1,500 m long deep gully during 2015, with one nearby his open well. He further enhanced the effectiveness

of the stop dams constructed nearby his field by excavating the sunken ponds in his 500 m gullied portion by investing ₹ 1 lakh from his own in March-April 2015. The excavated soil was utilized and spread in the fields for the proper leveling and reclaiming the washes developed in his fields making it more suitable for cultivation. The results of developing sunken ponds not only immediately reflected in the form of enhanced groundwater recharge to his open well and tubewells but other farmers also found the increased water availability from their tubewells. In the very first year of construction of stop dams and development of sunken ponds, Mr Lokendra Rajput could harvest a good production of onion and potato from his fields.

During 2015-2018, he attended various training programmes organized by ATMA, AICRP on Dryland Agriculture, Indore, State department of farmer welfare, agricultural development, and department of horticulture and got exposure to natural resource management activities particularly rainwater management practices adopted at College of Agriculture, Indore and in the farmer's fields through operational research activities. During 2017, he came in contact with Dr P.G. Nadkarni, retired professor from College of Agriculture, Indore and on his suggestions, he visited the *Kisan mela* organized at College of Agriculture, Indore and at Pune. Since it was not possible to construct a water

harvesting tank and storing runoff water even for few days due to high seepage rate of sub soil of the fields, from these exposure visits and persuasion, he got motivated and decided to invest some fund from his own for the development of a huge elevated lined water storage tank.

For this purpose, he engaged a contractor and got constructed a huge elevated water storage tank in January 2018 by utilizing 3,500 sq.m. land and by spending ₹ 6.50 lakh (Fig. 2.a). The size of the tank is 57 m × 45 m at top and 44 m × 33 m at bottom with a depth of 7 m. The depth of the tank below the actual land surface is 3.3 m (created through excavation) and above the surface is 3.6 m (created through forming of side bunds with proper side slopes all around). The tank is lined with 500 micron HDPE sheet with proper anchoring on all sides of tank. Since it is provided with side bunds all around, the tank will not be arresting runoff water. The tank is constructed in such a way that it would only collect the pumped water and only rain water falling over it. The estimated storage capacity of this tank is 14,623 cu.m. For the safety and to avoid the accident, the tank area is fenced from all around with chainlink.

Immediately, in the month of January 2018, he started collecting the pumped water from the tubewells which were providing groundwater interruptedly at reduced discharge rates. The same has been a regular trend in the various farmer's fields,



Fig. 3. Excavated soil reclaimed new era

even where excavated water harvesting tanks and sunken ponds are constructed in the lower most portions of the fields firstly to be filled with runoff water and after its use for irrigation using horizontal submersible pump and then with tubewell water for refilling and subsequent uses. Thus conjunctive use of rainwater/runoff and ground water is ensured by the farmers with water harvesting tanks in Malwa region. Mr Lokendra Rajput filled the storage tank to the brim. Instead of providing a horizontal submersible pump in the storage tank for irrigating the nearby fields, a unique and innovative approach was adopted by him. He used the almost defunct open well as sump well and made arrangement of siphoning the stored water from the lined storage tank into open well (Fig. 2.b). The siphon pipe is provided with a valve at the open well end so that the siphoning can be easily started whenever required. The underground pipelines are also installed all around the cultivated fields with proper openings and provision of valves for regulating

the onion crop in 1 ha and to potato crop in 7 ha area and he could harvest bumper crops with this additional irrigation water. After the harvest of the crops, the cultivated fields are planted with various horticultural crops like guava, mango, *ber*, cauliflower and various vegetables in sequence. Despite continuous irrigation from the tank, it still has sufficient water even for providing supplemental irrigation during probable prolonged dry spell in the *kharif* season of 2018. Thus, within a short period after the construction of water storage tank in his fields, Mr Lokendra Rajput diversified the traditional cropping system and this is a very encouraging and motivation way of incorporating integrated farming system. Due to availability of sufficient water, 8-10 labours are continuously engaged carrying out the farming activities. He is even planning to incorporate important livestock component like fish rearing.

The excavated soil was later utilized for the reclamation of gullied portion (Fig. 3), bringing new area

and diverting the irrigation water to different land portions. The provision of underground pipe lines enhanced the water conveyance efficiency, and saved time and labour for proper irrigation. The stored water was then utilized for timely irrigating

under cultivation by deepening and straightening the serpentine shaped gully and filling the low lying areas. In this way, an approximately 1 ha new area was brought under cultivation and stabilized the gully and avoided the chances of further development of gully.

CONCLUSION

The success of Mr Lokendra Rajput has generated a lot of curiosity among the farmers of the region. In the village Harsola, eight farmers have either constructed lined elevated tanks of different sizes by investing their own or in the process of completion/construction/lining of the elevated tanks. These elevated tanks are the modified form of earlier traditional storage tanks constructed at the upper most portions of the fields to be filled by open well and then providing irrigation to crops through gravity.

Mr Lokendra Rajput clearly suggested that the rainfed farming system is not adoptable in this region unless special efforts are made to enhance and ensure the water availability at the farm. The development and adoption of integrated farming system also require lot of patience and water management aspect is a key factor for its sustenance. Thus, utilizing all technological and hydrological options available for proper rainwater management and storage of sufficient water either through runoff, groundwater or with conjunctive use of ground and surface, it would be possible to develop an integrated farming system with the inclusion of multiple crops and multiple enterprises.

¹Principal Scientist, ²Scientist, Corresponding author's e mail: dhranade@rediffmail.com

Indian Farming

This magazine is for people interested in farming. The aim is to present scientific information in a popular style to the progressive farmers and people interested in application of science to day-to-day problems related to Indian farming. It has articles, book reviews, photo features, interviews, success stories and an editorial page. Special issues are also brought every year. One in January on 'DARE-ICAR Expectations from union Budget' and another on any special occasion; accent issues are also brought out on subject of topical issues. It is the most authoritative and popular farming magazine in India published since 1940.