

Effectiveness and utility of percolation tanks

of percolation tanks in Malwa and Nimar region

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The team of All India Coordinated Research Project for Dryland Agriculture, College of Agriculture, Indore, have been regularly visiting different villages of various districts of Malwa and Nimar region to assess farmers' priorities and problems related to agriculture. Initially during 1990, it was desired by the farmers that project should attempt to enhance the irrigation water availability and should provide improved varieties of different crops for increasing agricultural production and income. Thus, through ICAR supported and State financed watershed programmes, number of water-harvesting tanks were constructed mostly on government land for providing irrigation water to farmers. The improved varieties of different crops like soybean, chickpea, maize, etc. enhanced the farm productivity and income with the help of supplemental water through water-harvesting tanks.

Key words: Basaltic murram, Percolation tank, Ridge line, Watershed programme

THE success stories of water harvesting tanks during 2000 and later, convinced and inspired many farmers to allow construction of water harvesting tanks on their lands. This process helped farmers grow successful *rabi* crops like chickpea, wheat, potato, onion, garlic after *kharif* which was otherwise not possible.

After all these interventions, it was

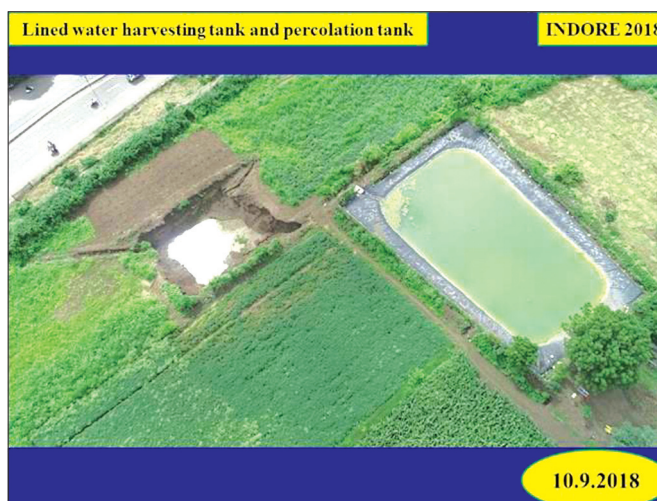
experienced that in several Malwa regions successful water-harvesting tanks could not be constructed. These locations have cultivated fields, which were underlain by fragmented basalt with high percolation rate. Thus, the runoff could not be collected and stored for longer time. The farmers did not agree to construct percolation tank as they wished to have surface stored

water for irrigation. Though they agreed that percolation tank construction would enhance the groundwater recharge, which can ultimately provide increased irrigation water through their tube-wells and open-wells.

During 1991, at the lowest boundary of College of Agriculture, Indore, a percolation tank was constructed with the provision of



Construction of percolation tank



Lined and unlined tanks



Percolation tanks adjoining to ridgeline and recharged open well

Recharging of open well due to sunken pond

gabion structure at outlet. The tank collected huge amount of runoff as per its capacity and then drained the excess water safely into the natural drain. The stored water is being percolated continuously and its immediate impact can be seen in the adjoining open-well, which started providing irrigation water almost throughout the year.

In 2000, the project identified a land portion, adjoining a ridgeline of the field of Shri S.C Sharma of Baroli village, Indore. The runoff water from the ridgeline entered with high velocity in field of Shri Sharma, which was eroding part of the cultivated field and thereby damaging the crops and retarding the fertility. The project constructed a 190 m long and 2 m wide earthen-bund in the wasteland by using a bulldozer and converted it into tank area, which immediately started collecting the runoff water in the upstream site of the earthen-bund. This helped reduce the losses in the cultivated field, soil erosion, and collected huge amount of runoff water in the wasted portion. Since the soil was underlain by basaltic murram, the stored water was percolated within few days. These resulted in the enhanced water availability in the nearby step-well and other open-wells located in Shri Sharma fields, which was otherwise an impossible situation in this village. Due to percolation tank, the 10 ha area could be irrigated with high productivity during *rabi* season. After 25 years of his agriculture activities, he became a successful and

resourceful farmer and his experience with percolation tank is inspiring many other farmers.

In 2005, a percolation tank was constructed by the project using bulldozer in a field adjoining to ridgeline in Jaitpura village, Sanwer district Indore. In the first year itself, huge amount of runoff was collected in the tank that enhanced the recharge of nearby open-well and tube-well. The storage of runoff water in the upper portion also helped in reducing the soil erosion in the lower fields.

In 2008, a progressive farmer Shri Keval Singh Patel from Hatod village, tehsil Depalpur district Indore contacted the project team and requested to construct water-harvesting tank through technical guidance. The project team observed that after the construction of tank, it would not be possible to retain the stored water for longer time as it was underlain by basaltic murram that have high percolation rate. Initially, Shri Patel was very distressed, however, he agreed to get constructed percolation tank. With the help of technical guidance from project team, he invested ₹ 3 lakh.

The eroded land portion of Shri Patel was adjoining to a ridgeline and uncontrolled runoff water was damaging his land and crops. In this natural drain line, he initially tried to adopt different measures like loose boulder structures to control the runoff, however, due of high velocity of runoff, he could not do so. The project team constructed a

percolation tank of size $80 \times 30 \times 2$ m in the natural drain line which is not only collecting the runoff but also reduced the chances of heavy damage in the lower portion of the fields. This stored water collected during rainy season since 2008, is percolated and used for recharging nearby open-well and tube-wells. Because of this, *rabi* crops are being grown successfully in most of the cultivated fields which was otherwise impossible before the construction of percolation tank. Shri Patel admitted that only because of team members, he got convinced for the construction of percolation tank, which is not only helping him through subsurface storage of runoff water but also saving the fields of other farmers from the soil erosion and recharging their tube-wells. Further, he is proud of solving the problems related to uncontrolled runoff technically and for helping the other farmers socially.

In 2010, a percolation tank (2500 m^3) was constructed by a farmer Shri M.K Patidar in Panod village, Sanwer district Indore, under the technical guidance of AICRPDA team. The farmer also provided two shafts for ensuring deeper percolation of the stored runoff water through it. These shafts were provided with metallic filter material on the openings to avoid the entry of foreign materials in ground water. This activity recharged the nearby two tubewells, which provided sufficient irrigation water for the irrigation to *rabi* crops in almost 10 ha area. This phenomenon is still

happening and providing sufficient irrigation water through tubewells even during scanty rainfall period.

Similarly the team visited Lonsara village, Rajpura district Barwani in the year 2014 for assessing the problems and providing technical guidance to village farmers. The team observed an earthen-dam (constructed in 1990), in between two ridgelines, that was collecting and storing huge amount of water and providing irrigation through canal in various villages. The provision dam recharges tube-wells and open-wells of the villages with no canals throughout the year. Before the construction of dam, a seasonal river used to flow naturally through these villages. The amount of flowing water in the river drastically reduced after the construction of earthen dam at the starting point. However, instead of flowing water, the quantity of subsurface water in the river belt increased in its 10 km long river bed. In this portion, the farmers constructed more than 100 open-wells at regular interval and in each open-well, ground water was available within 2-3 m. Due to availability of appreciable amount of irrigation water, these villages are growing multiple crops with wide range of crop diversity. Even in summer due to enhanced ground water, farmers are growing maize, tomato, cucumber, watermelon and various vegetables successfully, which was otherwise not possible despite being located on the bank of seasonal river. Even the submersible pumps of few tube-wells have been replaced by centrifugal pumps as groundwater is available within 3-4 m from ground level. This way, it can be experienced that the construction of earthen-dam is not only helpful in providing irrigation through canals but also providing subsurface water through open-wells and tube-wells in sufficient quantity for various crops grown during *kharif*, *rabi* and summer even in canal free villages.

Various village *panchayats* constructed stop-dams in gullied, which resulted in stabilization of gullies and made it possible to drain the runoff water safely for enhancing water availability in the village. The



Groundwater available within 2-3 m in open well due to percolation or seepage



Recharged tube well use of centrifugal pump in place of submersible pump

AICRPDA project organized a training programme to different watershed committees in 2016. In this training programme, the technological guidance was provided so that the area between two stop-dams in the stabilized gullied could be excavated to construct sunken-pond in the series. Further, the excavated soil should be spread into unlevelled field or in wasteland so that crop production could be enhanced. Shri Lokendra Singh Tomar from Harsola village, Mhow District Indore, adopted this suggestion in 20 June 2018, and constructed sunken pond in the gullied land and used the excavated soil to make a new field suitable for crop cultivation. The impact of this development was realized immediately in the first rain of the monsoon (22 June 2018). This sunken pond was immediately converted to a percolation tank and recharged nearby open-well and served as a source of irrigation that was otherwise not possible. Similarly, huge amount of runoff water retained in between the two stop-dams, which ultimately reduced the losses in the cultivated fields, located on the downstream sides.

In the research field of AICRPDA, in March 2018, a percolation tank of 907 m³ storage capacity was constructed. This percolation tank was constructed so that it not only receives excess water from the HDPE lined water-harvesting tank but also collected the runoff from other agricultural field. The soil of the area is underlain by basaltic murram that have 18-20 cm percolation rate per day. Therefore, the stored water in the percolation tank continuously gets percolated which ultimately enhances the chances of groundwater

recharge. Before the construction of the percolation tank, excess water from lined water-harvesting tank and runoff water from other areas continuously erode the lower portions of farm area due to higher velocity of runoff water. Immediately after the construction of percolation tank, the excess runoff water was stored in the percolation tank which ultimately controlled the soil erosion and its adverse effect in appreciable farm area. This way AICRPDA not only collected the runoff water in lined water harvesting tank (1781 m³) but also stored the runoff water in percolation tank for its ultimate utilization for groundwater recharge. Thus, rainwater is properly being managed for its further utilization during *kharif* and *rabi* season and thereby reducing the losses to offsite fields due to soil erosion.

Due to the success stories of the percolation tanks, many farmers are motivated and they are contacting the project team to provide technical guidance for the construction of percolation tank in their fields, which was otherwise a rare gesture. Based on the experiences gathered from all the percolation tanks, it can be pointed out that these tanks are very useful in storing the runoff and recharging the groundwater and even controlling the erosion losses to offsite field located on downstream site. This way percolation tanks can be considered at par with water-harvesting tanks in terms of enhancing availability of irrigation water for the rainfed areas.

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