WWW.MSSOY.ORG ⇒ MSPB WEBSITE WITH UP-TO-DATE SOYBEAN PRODUCTION INFORMATION

IRRIGATION WATER CONSERVATION IN A SOYBEAN-RICE ROTATION

In late 2013, MSPB launched its Sustainable Irrigation Project [SIP] to promote the use of tools that can be used to curtail the amount of water that is withdrawn from the Mississippi River Valley Alluvial Aquifer (MRVAA) to irrigate Mississippi crops. The SIP initiative was designed to highlight and promote the use of practices that will result in a reduction in the amount of irrigation water that is applied to all of the state's irrigated crop acres.

A large acreage of all Midsouth row crops and rice is irrigated, and soybeans that are rotated with these crops make up a significant portion of those irrigated acres. Thus, irrigation water conservation is and should be tied to using tools that will reduce the amount of irrigation water applied to all crops, which will in the long term ensure an adequate water supply for each and every field that is irrigated regardless of the crop.

In the years 2012-2019, harvested rice area ranged from 1.757 [2013] to 2.374 [2016] million acres in the Midsouthern US states of Ark., La., Miss., and Mo. [NASS]. Since a majority of these rice acres are rotated with soybeans, and since the soybean component in the rotation will likely also be irrigated, it follows that improving irrigation efficiency for rice as well as soybean will improve overall irrigation water use efficiency where the two crops are grown in rotation with each other.

A July 2017 Univ. of Arkansas publication titled Using alternate wetting and drying (AWD) rice flood management presents a detailed summary of how AWD for rice irrigation can be used to increase irrigation water use efficiency. Main points from this article and other linked articles follow.

- AWD is also known as intermittent flooding, and involves flood initiation and recession. It was originally designed to maximize rainfall capture and reduce irrigation pumping.
- AWD consists of flooding a particular field or paddy to a reasonable depth and then allowing the flood to naturally subside to the soil surface by the natural processes of infiltration and evapotranspiration (ET). This is unlike the current strategy of keeping a constant-depth flood level on an impounded rice area.
- AWD should be attempted only on silt loam and clay soils because coarse-textured soils will likely allow too rapid infiltration of applied water.
- AWD fields must use Multiple/Side Inlet Rice Irrigation [MIRI–see MIRI video and MIRI publication] or Zero-Grade irrigation systems. An MIRI setup should be capable of establishing an initial flood in a period no longer than 3 days. Subsequent floodings should be accomplished within a 24-hr. period.
- A Univ. of Arkansas Ext. Serv./NRCS publication titled Multiple Inlet Rice Irrigation [MIRI] Tips provides basic details for the MIRI setup. According to the Arkansas Rice Production Handbook, Chapter 10–Water Management, Table 10-8], both MIRI and Zero-Grade irrigation systems result in typically applying ≤2 ft. of water to rice, which is significantly below the typical amount of >30 in. applied to graded fields with contour levees.
- Fields irrigated using only levee-gate flood distribution are not suitable for AWD; i.e., only zero-grade fields are suited for this flood management system.

The above publications include details about required irrigation capacity to establish an initial flood, the required capacity of the water source for MIRI, and the recommended height of levee gates to create freeboard for capturing rain in the irrigated area (this last point is important to ensure that rain water is not lost from the area).

Using the above AWD setup for rice irrigation, coupled with using Pipe Planner, Surge irrigation, and soil moisture sensors for the irrigated soybean component in a rice-soybean rotation, should significantly reduce the total amount of irrigation water applied in this rotated production system.

Composed by Larry G. Heatherly, Updated May 2020, larryh91746@gmail.com