

# Improved rainwater harvesting system promising

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The new RFRRH system is shown after harvesting the purple coneflower plants used in the experiments. Credit: Photo by Borut Gosar

Ridge and furrow rainwater-harvesting (RFRH) systems with mulches were first researched in the flat, lowland, semiarid conditions of northwest China to improve water availability and to increase crop production. In RFRH systems, plastic-covered ridges serve as rainwater harvesting zones, and bare or mulched furrows serve as planting zones. The systems are becoming increasingly recognized and are being promoted in many parts of the world as a means to improve large-scale

production operations.

Although the RFRH system improves [water availability](#) and increases yield, it has many deficiencies that prevent its practical application, including relatively high soil compaction, high [soil erosion](#), and issues with [fertilizer](#) leaching, especially in heavy rainfall. Another system, called "ridge-furrow-ridge [rainwater harvesting](#)", or RFRRH, was first studied in flat, lowland humid regions of central Europe. In the RFRRH system, [polyethylene mulch](#) covers two ridges (planting zones) and the furrow between them, which serves as the rainwater-harvesting zone. The RFRRH system with mulches manages plant cultivation—even under impermeable mulch—without using an irrigation system.

In a new study published in *HortScience*, Borut Gosar and Dea Baričević from the Department of Agronomy at the University of Ljubljana (Slovenia) tested the RFRRH system in a field study using purple coneflower (*Echinacea purpurea* Moench). Gosar explained that purple coneflower was chosen because of its importance in Slovenia; the natural immunostimulant is widely cultivated for use in pharmaceutical preparations that are sold to domestic and international markets.

The study was conducted to determine the effect of the RFRRH system with or without a covering of two different types of polyethylene (PE) mulches and with or without supplemental irrigation on soil water content, crop yield, and time needed for weed control. Results showed that the RFRRH system with mulch increased soil water content in dry periods at the beginning of plant growth. The system also resulted in higher yields and reduced labor costs compared to the control. "In the non-irrigated plots, the results showed significantly higher soil water content during dry periods at the beginning of plant growth in the mulch-covered RFRRH system in comparison with the control (uncovered ridges). In comparison with the control, the mulch-covered RFRRH system significantly increased yield and reduced time dedicated to weed

control", said Gosar.

The scientists found that the RFRRH system with mulches offers many advantages for agricultural application. In addition to the system's proven ability to reduce weeds and increase crop yield, and the black PE mulches used may also increase soil temperature, reduce soil erosion, and reduce fertilizer leaching from the root zone. In the event of inadequate [rainfall](#), the RFRRH system with mulches enables simple supplemental irrigation using an agricultural vacuum tanker by flooding the PE mulch-covered furrow with hardly any ridge erosion.

The study confirmed that the RFRRH system with mulches is an efficient, simple and economical method for application in agricultural production.

**More information:** The complete study and abstract are available on the *ASHS HortScience* electronic journal web site:  
[hortsci.ashspublications.org/content/abstract/46/1/108](http://hortsci.ashspublications.org/content/abstract/46/1/108)

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