

Resilient Dryland Farming Appropriation: Pushing the Boundaries of the Dryland Wheat Production System

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The Resilient Dryland Farming Appropriation (RDFA) is a new federally funded project at the USDA-ARS Columbia Plateau Conservation Research Center and the OSU Columbia Basin Agricultural Research Center. The RDFA funds were secured through legislative efforts by Oregon wheat growers and stakeholders. The appropriation brings an impressive \$2M to the Agency annually, with 75% of funds allocated to USDA-ARS, and 25% of funds to OSU.

The RDFA funding allows us to collaborate more closely across agencies to answer large, cross-disciplinary research questions in detail. The complexity and nuance of dryland wheat farming is ever-changing. Greater efforts in multi-faceted research will allow us to address the complexity of the dryland wheat production system as a whole: economics, microbiology, agronomy, weed science, plant physiology, cultivar selection, plant pathology and more.

The RDFA research objectives are grower-driven. The project design was defined by a dialogue between Oregon wheat growers, ARS scientists, and OSU researchers. The ultimate goal of the RDFA is to increase resiliency and profitability in the dryland wheat cropping system. Profitability is a term that resonates widely. Our aim to improve the overall profit margin of the Oregon wheat cash crop while enhancing resiliency. Resiliency in this context speaks to the robustness of dryland wheat production systems including climate variability, market volatility, weather, and other unpredictable challenges.

The first iteration of the RDFA is to explore cover cropping and alternative cropping in two different rainfall zones. Our moderate rainfall location (~16 in annual precipitation) is at the Pendleton Station and our low rainfall location (~9 in annual precipitation) is hosted by Chris Rauch at Starvation Farms in Morrow County.

Cover and alternative cropping are a challenge in all dryland systems but especially under significant water limitations. Our goal is to understand and quantify the specific profitability trade-offs that may come along with cover and alternative cropping in our region. The data generated by the RDFA in the coming years will help growers objectively evaluate these trade-offs to decide if cover or alternative cropping systems make dollars and sense on their operation.

It is well known that cover crops use soil moisture that may reduce the yield of the following cash crop. However, the RDFA study will help us understand specific benefits of cover cropping that could outweigh yield reduction of the cash crop. These potential benefits may include weed competition/suppression, green manure for soilborne disease suppression, soil quality improvements, soil nitrogen from legumes, and grower enrollment in cover crop programs. Our detailed soil moisture data will help us understand the ideal termination date of the cover crop prior to critical depletion of the soil moisture profile.

Alternative crops are an opportunity in our dryland wheat system. There may be benefits of alternative crops that could outweigh challenges of marketability and yield. Potential opportunities of alternative systems are the ability to change herbicide mode of action, breaking soilborne disease cycles of winter wheat, reducing nitrogen inputs, and increased soil microbial nutrient cycling.

The RDFA will help us understand how we can successfully *push the boundaries* of cover cropping and alternative cropping in the dryland wheat production system. RDFA results will be widely accessible to growers, stakeholders, policy makers, and governmental agencies. We know many dryland wheat producers in

the inland PNW have tried cover and alternative cropping strategies with mixed success. policies regarding cover cropping and alternative cropping were designed with data from the US Midwest. The RDFA will provide crucial information regarding the profitability, sustainability, and risks of these systems specific in our dryland environment. Many governmental and non-governmental programs and policies regarding cover cropping and alternative cropping were designed with data from the US Midwest and we look forward to generating needed data specific to our region. We thank the producers and stakeholders for securing these critical funds. We also thank Starvation Farms for hosting the low rainfall site and we thank all involved OSU and USDA-ARS personnel for their efforts in this work.

Table 1. 2020-2021 Resilient Dryland Farming Appropriation alternative crop treatment list

2020-21 Alternative crops

1	Brown Mustard
2	Safflower
3	Flax
4	Winter Barley
5	Winter Lentil
6	Austrian Pea
7	Winter Pea
8	Winter Pea
9	Control (Fallow)

Table 2. 2020-2021 Resilient Dryland Farming Appropriation cover crop treatment list

2020-21 Cover crops

1	Tillage Radish
2	Spring Barley
3	Fallow
4	Phacelia
5	Winter Pea
6	Yellow Mustard
7	Winter Lentil
8	Common vetch
9	Fall Mix Alba winter barley Austrian peas Brassica
10	Spring Mix Austrian peas Spring mustard Spring barley Phacelia Purple top turnips Common vetch
11	Control (Fallow)



Winter pea seedlings in the alternative crop plots at The Pendleton Station.