



# BREEDING, FARMING, MILLING AND BAKING WITHIN A CHAOTIC CLIMATE

## WHERE WE ARE NOW

In 2021 national spring wheat yields were down 41% from the previous year. In the Washington, Idaho and Oregon region, which accounts for about 4.5 million acres, wheat yields were down from 40% to 100% depending on the farm and location. This resulted in the lowest production in 30 years. And the wheat that was harvested had generally low quality. In both 2020 and 2021 kernel size was down an average of 15% from “normal years”. Large kernel size is critical in roller milling systems where white flour is the target.

We’ve heard all the climate numbers enough to rattle them off with little effort to the point of dismissive (and risky) boredom. Warmest year and decade, driest year and decade, extreme drought, extreme cold, torrential rains and record snow. Here in Northwestern Washington in 2021 we had all of those in the period from June to December—hottest, driest, and wettest, then a foot of snow and single digits. Taken individually, these events are rare to the point of unheard of here. Taken together these events are impossible... or at least were.

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It is safe to say that the boat carrying predictable years has left and it ain't coming back. OK, so now what do we do to add resiliency to the small grains that inhabit this corner of our food system? How do we work through climate chaos so that we may live through it in the short term? How do we make sure we have wheat enough to mill, bake, sell and eat? And can we make that affordable while we are at it? And can we do this without inflicting further climate disruptions (ag accounts for about 9% of climate gasses in the U.S., much of that from fertilizer production and use, transportation and processing)?

### WHERE WE CAN GO

If our climate is resulting in weather that is radical, maybe it is time for us to get radical as well and develop and grow incredibly diverse grains that adapt to change, for millers to become more flexible in accepting rather than rejecting more diverse grains, and, ultimately, for bakers to “make it all work”. And it is time for us to admit out loud that using the whole grain is great for the planet and for us too. It is the best use of our land and the best use of the kernel to use all of it, not just the 70% that goes to white flour.

About 130 years ago wheat lost its diversity. For the 10,000 years prior to that wheat and all the grains didn't look so perfect in the field. Perfect being uniform. The fields were a beautiful mess. Mess being tall, short, red, white, awned, and awnless, with chaff and straw colors ranging from black to bronze to brown to white. This variation carried through to the mill and millers made it work. Same in the bake house. There was no real consistency. From field to field and year to year it varied. And we dealt with it.

But the commodity system is not we. It is they. And they hate variation. Variation is not part of the plan to standardize, homogenize, systematize

and all the other “izes” that led to the current systems of hyper efficiency. All this is great and all this works unless you want food that is not manipulated by Wall Street traders, keeps value within the communities that produce it and can prioritize things that we want like flavor, nutritional value, climate friendly efforts and access.

We know that plant variation deals well with annual shifts in weather or other forms of stress, like pests. It works this way: If an acre of wheat is made up of 1,000 unique types, there will be ones that do well and others that will not each year. If there is one type of wheat per acre, like modern wheat, it will all live or die or be damaged equally. That is what is happening now across the country. And it is not a realistic way forward if we want predictable crops in an unpredictable world.

### JOURNEY THROUGH THE PAST

There is a temptation to go back. Back to heirloom, heritage, ancient and land races. These all have a beauty and a value and a place. They have a story unsullied by modern genetics. But at one time the old wheats Sonora, Turkey, Red Fife, Rouge de

Bordeaux were all new. Very new. Very modern. In time, someone or some group selected them as superior. They yielded well, resisted climate and pest pressures and fit well into local food systems. Isolated in the late 1800s and grown deep into the 1900s, Red Fife and Turkey were grown on 10s of millions of acres in Canada and the US and were the main commodity white-flour roller-milled wheats for decades. They are the standards upon which all modern commodity wheats draw upon. Sonora and Rouge are older and softer wheats that were run on stone mills but were still very widely grown. These four wheats and 1,000s like them replaced wheats that did not perform as well as these new types

did. And they were improved varieties that were long-lived in the traditional wheat industry. They have value. But we have an obligation now more than ever to responsibly achieve as much as we possibly can per acre. Every farmed acre. And ancient, heirloom and heritage wheats yield less per acre than most newer wheats under organic, regenerative, or conventional farming. This brings price points up and accessibility down while requiring more acres to grow.

### FORWARD

We owe it to the early plant breeders, the women and men that gave us these beautiful old varieties, to continue their path of improving wheat and small grains. We owe it to ourselves to realize that how we farm, mill and bake can have an impact on the climate and the availability of food in the future. But can we develop lines of wheat that meet our expectations of reduced farm inputs, higher yields, flavor and nutrition, adaptability, and resilience amid climate chaos? Yes. The answer is variation back into our fields, in essence, modern landrace or heritage lines that can adapt and flourish. Lines that have been developed specifically to be different. Lines that carry in their pedigree the 1000s of lines that got us to this point.

At WSU Breadlab, with climate change and accessibility in mind, we develop new wheats that have the characteristics of old wheats but maintain a very high level of variation. We work with millers and bakers that help plot a way forward by accepting variation in their raw materials. Many of these millers and bakers are guild members and the ideas and efforts that they put forward will lead to a more variable and robust future for wheat and the other grains. 🌾



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