

The Whole Grain Connection Newsletter #29

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Global, Central or Local?

Where I live in Mountain View the electricity is still on. Even so, there are outages just a few miles away and at first, we thought the whole county would be without power, to prevent catastrophic fires in windy hot dry zones in California. No power for a few hours is one thing, but the possibility of no power for several days or a week, made for some reckoning. At first it was not quite real, and the thought came that it would be wonderful to have individual homes or groups of homes and businesses served by their own solar electric battery power systems. This way we would not need the monstrous grid of power lines that the power company is having such a hard time maintaining.

The episode is making me think. How much food do I have on hand that is edible without cooking or heating? What could I use as fuel for my small barbecue set in my fireplace? If I use anything other than charcoal, I'll pollute the air. Will I have enough draft to burn charcoal in my fireplace anyway? Should I empty the freezer? Do we need to worry that the water will cease to flow through our system? How many bottles of water do I have on hand? Should I go out right now for cash? Will stores and gas stations even be open? These things and so much more must be in the minds of all who face natural disasters, both projected and in the aftermath.

It made me think about how we organize our activities: globally, centrally and locally. We need all of these, but in our modern world global, and central trade and organization have become overwhelming. Globalization and centralization have been exacerbated by the wonders of the internet and also by the investment practices that shield so many from the actual destination for their money. Laws recognizing and preventing monopolies seem not to apply any more. We are desperately in need of a renewed effort to take care of our local trade and organization. This is the fabric that builds up to centralization and eventually globalization, yet it has been worn much too thin in modern times. It seems that this shouts out for a renewal of the sense that we are all in this together and that we are indeed capable of cooperating locally, and successfully creating solutions for our local needs. We need to establish once again that everyone matters and that all our actions at any age matter, in every era, in the building and maintenance of wholesome local communities and culture.

Surely the global and central handling of commodity wheat illustrates perfectly what can happen when global activities overwhelm the local systems. We are faced with wheat almost universally presented as refined wheat flour. Except for the artisan miller and baker movement, we might even have been left with no other choice for bread than sliced pan bread and Hamburger buns, made with roller milled refined and reconstituted flours. Commodity flour mills are the same refined flour roller mills worldwide. They cannot produce a satisfactory and efficiently made whole wheat flour, and they all prefer the one type of wheat, that is hard red, because it is the most

efficiently refined in their system. This contradicts the very nature of wheat, which is almost universal because it is so varied in its character to match the climate in each of its places of origin. The wheat commodity system also contradicts our recognition that we need to eat wheat in the whole grain form. We need 100% whole wheat milling as the norm for our basic needs, not just a meager 6% of the supply. And, we would be able to use the myriad types of wheat with equal efficiency in the mills designed for the purpose of whole wheat milling, such as the new impact mills or modernized stone mills.

Localized cooperation could bring about the availability of local whole wheat milling and baking. We need to generate interest within our neighborhoods, and we need help from our local governments, help with funding from our state governments, from local philanthropists and local investors. Local wheat milling was historically a cornerstone of local business and culture. We all need to eat, and we will all be healthier, happier and more productive if our basic wheat food is locally available to all and prepared without loss of essential nutrients.

Again, about malt, sprouted wheat and neither in some artisan bread

Several times I've tried to clarify my own understanding of this topic. Here's another attempt:

Because wheat flour naturally contains only very small amounts of simple sugars, the enzymatic degradation of starch to simple sugars to feed sourdough microorganisms in bread dough is important.

Two kinds of starch degrading enzymes have been identified as important in a dough of wheat flour and water, and their fundamental characteristics have been worked out. They are called alpha-amylase and beta-amylase.

Alpha-amylase is the enzyme that appears increasingly only as sprouting progresses in the moistened grain. This means that its presence in flour for a dough is only possible if the flour was made with sprouted grain or if some sprouted grain flour, such as enzyme active malt, is mixed in. Also, this is the enzyme that can degrade any form of starch, damaged or not, and which is eventually stopped by enough acidity produced by a sourdough leavening. A controlled amount of alpha-amylase in a dough boosts fermentation. In a sourdough system the actual amount of alpha-amylase in the dough, provided it is not excessive is not crucial since excessive breakdown of starch is prevented by the acidity that eventually develops before baking.

Alpha-amylase presence is recognized when there has been starch breakdown, as in the Falling Number test. Sound wheat has a FN of approximately 300 seconds or greater. If the FN is approximately 250 seconds, it is assumed that a sufficient amount of alpha-amylase is present to produce active fermentation in bread dough and that the flour will produce a well leavened bread. Other enzymes are also at play during sprouting such that eventually, if sprouting goes too far, for example during pre-harvest

sprouting in the field over several days, then the bread structure-forming proteins will be too much degraded to produce bread loft. This can be recognized by a FN value much lower than 250 seconds for the flour produced.

Here is a link to the abstract of a [new scientific paper about sprouted wheat flour](#)¹, which concludes that whole grain breads are improved in flavor and texture when (short-time) sprouted grain is used to make the flour. As mentioned above, the alternative to using sprouted grain flour is the addition of a small amount of enzyme-active malt flour, to a flour made from grain with a very high FN. California grown wheat usually has very high FN values, well above 300 seconds.

A suggested amount of enzyme active malt, to use in bread, is up to 1% with respect to the total flour. The enzyme active (diastatic) wheat malt ideally has diastatic power greater than 140 degrees Lintner.

Sources for diastatic wheat malt: [Admiral Malt](#)²; [Grist & Toll](#)³; [Briess Malt](#)⁴.

Beta-amylase is restricted in its ability to degrade starch; it can only attack damaged starch. Beta-amylase is the enzyme that is naturally present in all wheat flour and allows an artisan baker to produce a leavened bread without adding any enzyme active sprouted grain product (malt), or using partially sprouted grain for the flour. In this case, the amount of fermentable sugars produced for the microorganisms is dependent on the amount of damaged starch present in the flour initially. Starch damage can occur during milling or can be deliberately done by cooking some of the flour with hot water (gelatinizing the starch). 10% Starch damage is considered a possible maximum and 5% an approximately ideal amount.

Coastal grain experience

The California coast is known for its foggy coolness in summer. It's the cooldown place to be for those who have endured too much summer heat in the inland valleys, and it is where beautiful vegetables, greens and berry fruits can be grown practically year-round. In Half Moon Bay it is where pumpkins appear in a festival at this time of year.

Growing wheat here is tricky. We soon found that the Sonora variety could not withstand the cool summer fogs and easily succumbed to stripe rust. Rye would seem to be a suitable crop, but somehow it could be grown for one year, but the seed would not be nearly so productive the following year. Eventually we realized that rye cross pollinates with itself. This feature coupled with the "year-round warm enough to grow" temperatures meant that the chosen spring type rye could easily be converted to less appropriate winter rye as a result of crosspollination. Rye is difficult to maintain as a

¹ <https://onlinelibrary.wiley.com/doi/pdf/10.1002/cche.10187>

² <https://admiralmaltings.com/malt/yolo-gold/>

³ <https://www.gristandtoll.com/current-selections/>

⁴ <https://food.briess.com/products/briess-specialty-malt-flours/>

purely spring type and in any case, I read that the spring type is less productive than the winter type rye. So, rye has also been abandoned in our efforts.

Jeff Crofton is the farmer who has been planting various wheat varieties in several plots located around Half Moon Bay, and along the way discovering what does and what does not work here. He has had success with several barley varieties, grown just for a single season. Jeff likes to bake so he tried growing wheat that he knew would give him interesting bread. Khorasan and Red Fife have been particularly successful when planted at some time between early December and February. However, failure ensued when plots were flooded. We have not been able to plant on truly raised beds that might have held the wheat plants high enough to prevent their drowning. We have discovered that to avoid the flood season in higher rainfall winters, and on flood prone areas, we can plant and dry farm spring types of wheat as late as March or April, although yields are considerably smaller than if planted in December or January, with harvest time in late August into September.

Further south on the California coast just north of Santa Cruz at Pie Ranch, Jered Lawson has had success growing India-Jammu. Pie Ranch has a stone mill, so mills their own wheat to 100% whole wheat flour and has pies made for them by Companion Bakeshop in Santa Cruz. You should see the delight on visitors faces when they find pie at Pie Ranch during their trip along Coastal Highway 1.

Asturias in Northern Spain has a similar climate to the California coast, and they have a long tradition of growing and using spelt in their cuisine and for making bread. So far, all the spelt varieties from Asturias are spring types and therefore can be planted at any time from December to April for dry farming. The more usual spelt varieties already in use in North America are from the Alpine foothills of Central Europe; they are generally winter types which therefore must be planted a month before the spring equinox, by Valentine's Day, if they are to come to fruition before the fall.

We have had success growing several landrace spring varieties from Asturias, in Half Moon Bay. "Spanish Spelt" from Asturias has also been grown successfully in the Sacramento Valley and in Tulelake, since 1999. Now that we are propagating other spelt varieties from the Asturias region, we find a need to distinguish between them. "Spanish Spelt" in the *Whole Grain Connection* catalog is now called "Silanes", for the more precise location of its origin. Another spring spelt variety of interest from Asturias, called "Asturien", is in the *Slow Food Ark of Taste*, and this too has been successfully grown on the coast, since 2015.

So far we have shown that farmers on the California coast could have the option to use wheat when they need a grain rotation crop. However, for their wheat crop to be fully utilized we need to also establish a local grain handling facility and grain storage. Coastal grain likely will always need to be dried before it can be stored. Certainly, the grain needs cleaning after combine harvesting, and if spelt is to be grown we shall need

dehulling equipment, since spelt does not thresh out from the spikelets during combine harvesting. All this will be possible if enough coastal farmers realize the potential for growing a grain crop of value both for 100% whole grain products, and for soil building and carbon sequestering. Landrace spelt has one of the largest root systems of any wheat!

Yield expectations from dry-farmed landrace wheat in California

Yvonne Jacobsen writes nostalgically about the history of agriculture in the south San Francisco Bay Region. Her parents owned the last gorgeous cherry orchard in existence there and saw it transformed into a huge housing complex. In her book "Passing Farms - Enduring Values" she describes the hey-day of wheat in California, during the 1860 - 1880s in the region now known as Silicon Valley.

Here are some quotes:

"By 1875 there were five grist mills serving the valley, eventually there would be ten....."

It was quickly seen that despite the dry summer, California farmers could grow at least two crops of wheat by planting to catch the early rains and again before the soil dried out in summer.

Grain farming was dry farming. Yields were anywhere from 16 bushels per acre, typical of other parts of the United States, to an incredible 80 bushels per acre in some cases. Thirty and forty bushels were the norm."

(An average weight for a bushel of wheat is 60 pounds)

Some recent thoughtful and useful articles

[Good Corn Tortillas](#)⁵

[A Shifting Climate for Grains and Flour by Andrew Ross](#)⁶

⁵ https://www.nytimes.com/2019/10/07/dining/corn-tortilla-kernel-of-truth-organics.html?nl=todaysheadlines&emc=edit_th_191009?campaign_id=2&instance_id=12776&segment_id=17705&user_id=2cda8182c9d3a9f5365af13e984477e1%C2%AEi_id=592272651009

⁶ <https://www.cerealsgrains.org/publications/cfw/2019/September-October/Pages/CFW-64-5-0050.aspx>