

The
WHOLE GRAIN CONNECTION

Aiming to enhance the desirability and availability of 100% whole grain breads, and other 100% whole grain products, from organically and sustainably grown grains, and thereby connecting farmers and bakers

Newsletter Number 3
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Plantings in California for 2001

Most of the Whole Grain Connection wheat seed produced in the 2000 harvest, has been sold and planted, and in most cases is now well established. Approximately 10 acres are planted in California, including some very small trial and multiplication plots. Trial varieties include spelt, emmer and poulard varieties. The range of climates is broad, so giving us an opportunity to recognize where the varieties will grow best. The counties where this wheat is growing include: Marin, Yolo, Stanislaus, Alameda, Del Norte, and Mendocino. No one seems to have had the heart to mow or graze their crop, in an attempt to pre-empt lodging, thwart weeds, and increase the protein in the grain. The idea of grazing or mowing, actually, has plenty of history, and is currently practiced in New Mexico, where their winter wheat is grazed. Perhaps we can try some mowing next year!

Wheat Collaborator Meeting

The California Wheat Collaborator meeting is held in Sacramento each year, under the direction of Bonnie Fernandez of the California Wheat Commission. It's an opportunity for plant breeders to discover from millers and bakers, how they liked their latest wheat seed releases. Millers who usually attend this meeting produce refined flour, almost exclusively. Monica Spiller volunteered to test fifteen of the latest seed releases for 100% whole wheat barm bread making, using a mini-loaf recipe, and presented her results. Her results matched those of the other collaborators in terms of a ranking of the new varieties for bread. The

results were expected, but might not have been seen when comparing refined flour breads with 100% whole wheat barm breads. Farmers who participate in the seed breeding program were also present, but no-one other than Monica Spiller represented the viewpoint of the organic farmer. Her goal in becoming part of this group, is to have organic wheat production recognized as a valuable alternative for California wheat farmers. Also she would like to see selected wheat varieties from the Whole Grain Connection submitted for collaborative study.

From Lee Jackson, the California University Co-operative Extension wheat agronomist, Monica learned that they are already working on the production of a manual for organic wheat farming in California. In the future, farmers who would like to grow their wheat organically are likely to find much more help from the Co-operative Extension service, than in previous years.

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SOAR Inaugural Meeting

The first Scientific Congress on Organic Agricultural Research (SOAR), was held in January, 2001, in Pacific Grove, California. It was a gathering of approximately one hundred people who wanted to see more publicly funded research in organic agriculture. The group included a high proportion of farmers, and university researchers who have an interest in organic agriculture. Everyone attending wanted especially, to express their opinions on the directions that organic agricultural research should take. Mark Lipson, of the Organic Farming Research Foundation, was the leader in initiating this conference and he is anticipating a series of these conferences around the country. Monica Spiller was among the attendees and presented a description of the Whole Grain Connection wheat research as an example of some ongoing organic farming research. She also expressed the need for research into matching well established plant varieties with local climate and soil conditions, for organic agriculture, wheat being just one example. The Organic Farming Research Foundation (OFRF), has documented organic agricultural research activities and has recognized that organic agricultural research is miniscule even in comparison with the acreage of organic farming. Government funding since 1988 has been mostly through the USDA's Sustainable Agriculture Research and Education (SARE) program. SARE funds are only 2% of the USDA university research funds, and only 12% of that small proportion went to organic agriculture. These statistics were gleaned from the OFRF study: State of the States, Organic Farming Systems Research at Land Grant Universities 2000-2001, compiled by Jane Sooby.

Wheat interest from out of state

Farmers in Idaho, Virginia and Vermont have enquired about our wheat seed program and the concepts behind choosing varieties suitable for organic agriculture in their particular climatic region. It is possible to

apply the same ideas that enabled us to find out about the history of wheat in California, and to look into the corresponding literature for other regions. The source of starter seed can be the USDA Small Grain Collection, in Aberdeen, Idaho.

What's Happening in New Mexico?

Organic Wheat Business established in New Mexico - a precedence for California
So far, a Californian organic wheat farmers business organization is still waiting to be started. If we are waiting for some precedence for this, then New Mexico is the place to look. Their beginnings in the 1980's were as vague as ours were a year ago, here in California. Eventually various interested people concerned with reviving a historical crop in New Mexico, wheat varietal selection, organic farming methods for wheat, bread baking..... came together under "the Rural Agricultural Improvement, Public Affairs Project". With advice from their cooperative extension people, they obtained funding for a sustainable agricultural advisor, and for a study to determine the market potential for their organic wheat products. From the beginning the farmers remained totally responsible for their crops starting with seed choice and including the sale of flour, and everything was kept organic. By the mid 1990's some 30 farmers were involved and had formed the Organic Wheat Project business organization. This is allowing them to realize a reasonable profit on their wheat crop, as well as the support of being part of a joint venture. In New Mexico, bakers at Farmers Markets now sell breads and tortillas made from New Mexican organic wheat, and they are pleasing everyone at the market, as legitimate purveyors of local produce. The farmers' experience has already revealed that it is considerably more expensive to produce refined flour from their wheat, than it is to produce 100% whole wheat flour. The production of whole wheat products is a valuable part of their business; after all, customers who are interested in organic

wheat are also likely to be interested in the health aspects of whole wheat.

Editorial Meanderings

Organic farmers are thinkers

If in your college days, as I did in the late 1950's, you learned that the nerve gases developed during World War II, were organo-phosphates, you would surely always want to avoid anything designed to be a toxic organo-phosphate? Then if you knew that these things which were so damaging and possible deadly for humans, were being suggested to annihilate insects, would you even dream of bringing any of these related organo-phosphates in contact with, or near your food supply? A thinking person would always say "no way".

Now the latest theory for the cause of Mad Cow disease has gone beyond the idea that it is an infectious disease. This is not surprising because no-one has yet found an infecting organism. Instead they have found damaged proteins (damaged prions), in diseased cows, which are not in themselves infective agents. The latest cause suggestion is an organo-phosphate insecticide painted on cows to prevent the invasion of the warble fly. It takes only a little imagination to realize that these organo-phosphate insecticides are likely to concentrate in nerve tissue. Rather than infected tissue being the cause of mad cow disease proliferation, it is much more likely to be organo-phosphate insecticide contamination, that has led to further disease outbreak..... The story is written up by Fintan Dunne in ACRES USA, March 2001 This is very disturbing, especially knowing that consumers in general, find it hard to believe that other humans would be so daft as to put something so poisonous as organo-phosphate insecticides, on or near their food supply. The average supermarket shopper certainly does not expect such daftness in producing their food.

The idea of rendering food plants immune to the effects of herbicides by inserting herbicide resistant genes, certainly is not a

way to keep herbicides away from our food; it's actually a way to keep them right there with the food! We surely must keep our heads when those advocates of genetically modified food plants present their case. Also, why should we believe that genetically modified corn, soybean and cotton are irrevocably present. Rather we should still be working to grow all our crops as we want them to be: poison free, and genetically intact. Organic farmers feel fully, the responsibility of producing food that is wholesome and untouched by poisons. We have chosen to think carefully about the way in which we are producing food, and we have chosen to produce it in harmony with the natural world, to the best of our ability. Organic farming is much more of a philosophy than a set of government regulations. It surely will be impossible to define every nuance of organic agriculture as a human-made law. We must never rely only on those government standards as a description of organic farming practices. It is going to be even more important in the future to keep on thinking about our methods as organic farmers; to think constantly and be observant, so that we can resist the path of unsound ecological practices, and instead find methods that flow ever more smoothly with the course of the natural world.

Why, older wheat varieties?

This is quite a loaded question, given the fact that modern wheat varieties appear to be growing quite nicely in an organic wheat program in New Mexico. There they are growing organic wheat for local use in bakeries and breweries. Some of their wheat is being used in the whole grain form, for bread and for the breweries, but the rest is being roller milled to a refined flour for white bread. In New Mexico, their goals in choosing varieties included a desire to make modern refined wheat breads, from organic refined flour. They therefore wanted to grow hard red wheat varieties that would be suitable for roller milling to refined flour,

and these they have found among available modern wheat varieties.

So why is the Whole Grain Connection, working on the production of old wheat varieties?

Primarily, the Whole Grain Connection wants to see 100% whole grain breads, and other 100% whole grain products made from organic wheat, available for all to buy if they want to. We see organic whole grain foods as being a necessity for optimal health; refined grain products do not favor optimal health, because they have had nutrient-rich bran and germ removed.

The founder of the science of genetics is generally thought to have been Gregor Johan Mendel (1822 -1884) an Austrian monk. Ever since Mendel's work on heredity was published, plant breeding has been a revered and highly successful profession. Instead of the earlier practice of selecting individual wheat plants that were favorable for a local climate and a local product, these breeders started breeding plants for imagined desirable characteristics such as size and color, and their success made many of them famous.

Roller milling was invented in the 1880's to produce refined flour from the hard red wheats from the vast prairies, and immediately it became the milling system for which all wheats were to be tailored. Stone mills were abandoned almost entirely in just a few years. To be brief, hard red wheats are relatively low yielding, but are reliably disease free in climates with a hot summer, and year round humidity. In other regions with hot dry summers, and adequate water in the winter and spring, varieties were white, relatively soft, but high yielding. There are many other combinations of climate and wheat types, but for each region the breeders aimed for high yielding hard red wheat, for roller milling, and to a large extent they succeeded. Even though the baking characteristics of these wheats is quite varied, the variation can be largely masked by

judicious blending by the millers. Breeding for hard red wheat in this way continued unabated, until the Green Revolution of the 1960's.

By the 1960's the new fashion for farming, was to dramatically increase yields by the addition of synthetic fertilizers, and plenty of irrigation. Such lush growing conditions for wheat produced extra tall stands of wheat that easily fell over, or lodged, so making the harvest inefficient or causing the grain to be damaged. Breeders then turned their attention to producing hard red wheat varieties that were also short, so that they would not grow tall enough to lodge. Very many modern wheat varieties are just knee high for this reason. Normal height wheat, at three feet or more, is quite effective in shading out weeds, but the short wheats allow weeds to grow much more readily. Hence the introduction of herbicide use, to eliminate weeds, especially under the lush conditions of extra fertilizer and plentiful irrigation. The lush conditions presented further challenges to the breeders, because these luxurious growth conditions also favored fungal and insect attack. The wheat needed to be resistant to fungi and insects, or alternatively fungicides and insecticides were included in the cultivation regimen. All this manipulation of wheat continues to give plenty of work to the millers and bakers, who must contend with a continuous stream of newly introduced wheat varieties. For the farmer the expectation is that these modern varieties will be grown for high yield using synthetic fertilizers, generous irrigation, herbicides and possibly fungicides and insecticides as well. The seed is usually proprietary, and must be bought, and so must the fertilizer, the irrigation water, the herbicides, the fungicides and the insecticides. This certainly does not fit into the organic farmers style.

The organic farmer expects to find a variety that grows well and disease free in the local climate and soil, without the use of irrigation, except as a controlled seasonal flooding, is tall enough to shade out most

weeds, yields reasonably, and can be used for a popular food. The organic farmer also expects to be able to select and save the seed from one year to the next, so developing a locally successful variety. From all this it can be seen that the varieties that were in existence before the 1880's are the most likely to be suitable for the organic farmer, and also for the production of whole grain products. A few of the varieties developed later that are not proprietary, may be of interest to some organic farmers and bakers, provided they can be grown successfully under organic conditions.

Now in 2001, we are poised to combat yet another round of genetic manipulation in wheat, the insertion of genes for perceived desirable characteristics. This time though the gene source is not necessarily from wheat or even from another grain. The first attempts are to insert a gene that will cause the wheat to resist the effect of an herbicide, a trait that is totally inappropriate for the organic farmer.....

In order to develop strongly appropriate local wheat varieties, organic farmers need to return to pre-1880's wheat varieties and once again practice selection of the seed from the best plants, from one year to the next.

Fortunately, wheat is self pollinated so that we have a good chance to maintain a separate supply of wheat seed that is genetically intact and has stood the test of millenia. This needs diligence, and vigilance on the part of all farmers who grow wheat organically, in order to succeed. In practical terms it means that it will be necessary to use only that equipment that has previously been used for organic, genetically intact crops. It also means that organic wheat farmers will need to bear the responsibility of carrying their crops from saved seed, all the way to the consumer, if they are to receive a just return for their work.

About Wheat

A Cultivated Wheat Botany

Species name (Ploidy or number of chromosome sets)	Hulled subspecies name (common name)	Free-threshing subspecies name (common name)
<i>Triticum monococcum</i> Diploid (2)	<i>monococcum</i> (einkorn)	none exist
<i>Triticum turgidum</i> Tetraploid (4)	<i>dicoccum</i> (emmer, farro, polba)	<i>durum</i> (pasta wheat) <i>turgidum</i> (Poulard) <i>turanicum</i> (Kamut, Khorasan wheat) <i>polonicum</i> (Polish wheat)
<i>Triticum aestivum</i> hexaploid (6)	<i>spelta</i> (Spelt, Dinkel, épeautre)	<i>aestivum</i> (common wheat, bread wheat) <i>compactum</i> (Club wheat) <i>sphaeracoccum</i> (Indian dwarf wheat)

A Wheat Botany

(continued from page 5)

Wheat is highly varied in its characteristics, and therein is the fun of choosing the wheat to suit your farming environment or in the case of the baker, the baking possibilities. A broad classification such as in the table shown on page 5, shows the connections between the main species, and sub-species. The initial broadest grouping is according to the number of chromosomes possessed:

- *Triticum monococcum*, the simplest original wheat has just two sets of chromosomes, and is therefore called diploid.
- *Triticum turgidum* are tetraploid wheat types, simply because they have four sets of chromosomes.
- *Triticum aestivum* are hexaploid, because they have six sets of chromosomes.

Whether or not the hull is easily removed during threshing gives the next level of description within each group. When the wheat hull is as difficult to remove as a rice hull, the wheat is usually described as a hulled wheat; during ordinary threshing the hull remains intact when the wheat head is broken up, and the seeds are not released. The hulled varieties in the diploid group, are *triticum monococcum ssp monococcum*, and the best known example is einkorn. Einkorn is closely related to the form that grows wild still in the Zagros Mountains in Iran and elsewhere in the Middle East.

In the tetraploid group the hulled varieties are *triticum turgidum ssp dicoccum*, and the best known example is emmer wheat. Emmer wheats were the main wheat crop in Ancient Egypt for about 7000 years; it was the wheat type growing all around the Mediterranean almost exclusively, until Roman times.

The hexaploid hulled wheat is *triticum aestivum ssp spelta*; Spelt of the kind still grown in the foothills of the Tyrolean Alps is a typical example. The common names for the hulled wheats occasionally cause confusion, when they are applied to both emmer and spelt. The Italians use the word “farro”, and the Russians use “polba” for all

kinds of hulled wheat, but historically in each case, their main hulled wheat crop was emmer wheat.

The free threshing wheat types are found only among the tetraploid and hexaploid wheats. There is no free threshing type corresponding to Einkorn.

Free threshing tetraploid wheats, *triticum turgidum ssp durum* are currently very widely grown all around the Mediterranean, and elsewhere with the Mediterranean type climate. They are generally referred to as the durum wheats. Very closely related and also free threshing are the brand named Kamut wheat, the Poulard wheats, and the Polish wheats. Of these, the Poulard wheats, *triticum turgidum ssp turgidum* are of great interest because at present, they are hardly grown at all, and yet they are among the most magnificent of all the wheats. They are tall, strong stemmed and possess dramatically large, long bearded heads. As a group they are tolerant of more temperate climates than the durum wheats.

The most widely grown of wheats are the hexaploid free threshing types, of the type *triticum aestivum ssp aestivum*, and there are hundreds of them, far more than any other type of wheat grown. The *ssp compactum* club wheats are very distinctive in that their heads are very short and compact. And the *ssp sphaerococcum*, is easily recognizable because the seeds are almost spherical and the plants are short and sturdy looking.

Modern hybridized wheats include crosses between all the main wheat types shown in the table, on page 5.

Equipment

Availability of stone mills

The Society for the Preservation of Old Mills (www.spoom.org) would seem to be the best way to discover how to own a classical horizontal stone mill that could still be powered by wind or water. The members take an interest in all kinds of historic milling equipment, and fortunately for us, their membership includes some real craftspeople who have learned how to dress millstones, build and maintain water wheels, and totally restore old mills that once produced stone ground flour.

The most readily available modern stone mills are those manufactured by the Meadows Mill Company in North Wilkesboro, North Carolina (telephone: 336 838 2282). These mills have granite stones hung vertically, and are driven by an electric motor. The millstones range in size from 8 inches in diameter, suitable for household or small farm use, to 30 inches in diameter for major milling or baking businesses. The flour produced can be finely or coarsely ground, and it is cool as it leaves the stones. The design is functional, and it is possible to keep the flour dust level down, by adding a fabric sleeve between the mill output and the receiving container, or by using an elevating fan system. The hopper is self feeding and has a magnet inset to capture any metal impurities. Actually this presents the only important design flaw, at least in the 8 inch model, that I own. The magnet is set above the grain shoot. Grains become permanently caught in it, and after a time are invaded by weevils or moths. Several times I have mentioned this fault to Bob Hege at Meadows Mills, and have suggested that the magnet could be located underneath the grain shoot. In this way the grain shoot could be made completely smooth and without any crevices. So far I have been unable to convince him. If you are interested in this problem, I hope you will

call Bob and mention it. These mills are among the very few available and give a very good flour, consistently day after day.

Other mills for producing stone ground whole wheat flour, currently being manufactured, are as far as I know, all made outside the USA.

Advertisements

Starting with our next newsletter we would like to run advertisements from makers and suppliers of small scale farm, milling and baking equipment, from farmers who are growing and selling organic wheat, and from 100% whole organic wheat millers and bakers who would like to buy organic wheat.

Photo ready copy can be submitted, or we can design a simple advertisement for you, from your information.

Prices will be \$20.00 for a quarter page, \$10.00 for an eighth page, and \$5.00 for a sixteenth page-size advertisement.

The Whole Grain Connection, Newsletter

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