

Small Grains Field Day
February 11, 2017
Open Field Farm, Petaluma, CA
California Grain Campaign

Dave Miller (California Grain Campaign)

Welcome and introduction to the California Grain Campaign, which works with millers, bakers, and farmers to support local grain markets. The project was inspired by New York City farmers markets which challenged food processors to source 15% of their grains locally. This was successful and has now expanded to 350,000 tons of grains they are using which is supporting small scale grain growers in the area. CGC is challenging food producers to source 20% of their grain locally by 2020.

Part of what inspired this event was that Dave began to notice a pattern that small scale grain growers were mixing different grain varieties in the field at harvest. This made him think that there was a lack of experience for a lot of these small scale growers and that an event bringing the growers together to share information would be beneficial for all.

Seth (Open Field Farm)

Started growing grains as a way to boost their CSA growing a crop that did not need water, wanted to save water for the veggies.

Also, would like to grow all the feed for their chickens. Need 50 Acres for chicken feed. This need is what allowed for him to get the equipment he needed to grow grain.

Would like to grow 5 – 10 acres in edible grains for members.

Mai (California Grain Campaign)

This is something new and big and we must work together to build the grain movement. Wants to create more institutional support for local grain growing. Wants to connect growers, and bakers and millers to strengthen to the movement with a goal of having a conference next year to bring all these people together in a formal setting.

Jared (Organic Seed Alliance)

Seed Selection

Steps to choosing a variety

-Understand the difference between winter and spring cereals – winter types have a vernalization requirement and potentially need up to 8 weeks @ 40F or below to trigger reproductive phase. The plant will need to have been established and be small and then experience this 8 weeks. Spring types do not have this requirement.

-Heirloom vs Modern varieties. This is a personal decision.

-Heirlooms have stories, a sense of place, possibly more genetics, and can be more easily adapted to your climate if you save seed.

-Quality traditionally measured by protein and endosperm, but this is not enough information, does not directly relate to how happy bakers were with the product, must do bake tests

-Disease –Stripe rust resistance is something growers may be looking for, rust can lower yields and quality, can use creative planting times to manage this sometimes, avoid the wet and the cool times will reduce the rust.

-Plant Height – heirlooms are generally taller, can be good in terms of weed competition and can harvest the crop at a higher point avoiding weeds getting mixed in with the harvest. Taller plants are more susceptible to lodging. These tall heirlooms can also be uneven in height and can create a harvesting challenge.

-Modern varieties may have intellectual property, Plant Variety Protection Act (PVPed), check the Plant Germplasm Website to find out if a variety is PVPed. If it is, for 20 years from the date when the variety was released there are restrictions. Can save for yourself, but not distribute. Beginning to see new contracts inside PVPed varieties that have further restrictions which often now include that you cannot save the seed for yourself.

-Seed Born Diseases, conventional movement has focused on fungicides and other treatments, so the art of avoiding them is being lost. Common seed born diseases are common bunt and stinking smut. How to avoid? Smell it! Stinking smut smells. Buy certified seed, but not always full proof. Get plump seed with good color and no smell. There are hot water treatments that can wash the disease of stinking smut as it is only on the surface, however loose smut is inside the seed and they are working on steam treatments in Vermont to penetrate.

-Variety Trials are very important. The OSA website has information about how to do a variety trail. Partner with bakers as a part of your trial.

-Where are people get their seed?

-Modern varieties in larger quantities available from Washington Crop Improvement association.

-Heritage varieties available through the Whole Grain Connection

-Source seed from each other

-Northcoast Grain grower list serv

-Get a small lot and increase the seed yourself (Bountiful Gardens Seed Company, USDA, Universities)

-California Wheat Commission has a list of modern wheat varieties

-When a new variety is developed and released as a breeder seed then it is a foundation seed which is used to produce certified seed. Different levels of stringency that involve the number of off types that are permitted and weed seed allowed. Seeds examined post harvest.

-Quality assurance programs for heritage grains, new program through the whole grain connection. A farmer can buy a special stock of seed the is quality assured and then follow certain protocols and then you can sell it as quality assured certified when sold. So you buy the certified seed and then have to make sure your that your equipment is super CLEAN of any other variety then once in ground inspectors will come check the field. You cannot have grown in the field the year before to ensure that there are no volunteers. This is not cheap process but can be worth it if you want to develop a crop market.

-There is research about how different varieties can affect the microbial populations in the soil.

-If you buy seed that was intended for consumption you are vulnerable to disease and off types.

Larry Kandarian (Kandarian Organic Farms)

Does not grow any modern grain varieties.

In the seed business for 45 years.

“An ancient guy that does old grains” – really into the faros

Genesis = fertile crescent - Einkorn Faro (petite) 2 chromosomes

Genesis = fertile crescent - Emmer Faro 4 chromosomes

Genesis = Europe – Faro Grande, 8000 year old spelt, 6 chromosomes

Hexaploid Faro – 6 sets chromosomes

Only crossing grass = corn

Faros have, soft seed and a hard husk, tall, wont cross, extremely low rust pressure. Many Varieties hard to thresh, but the Ethiopian Blue tinge is easier.

Modern wheat's are bred with Chinese varieties to be short and tiller more. Also, to be able to use the combine to cut and thresh at once which is harder when the grain is tall.

Larry works with the bakers at the Santa Monica farmers market. Bakers were hesitant at first. Vintage grains, like wine, have a lot of variability from year to year, this required yearly testing for the bakers.

Tall grains often lodge so Larry windrows, then lays down tarps and then rolls down the grain crop onto the tarps. Rarely uses a combine.

Saves all of his own seed.

Grows Tibetan Black Barley an likes it. Recommends trying a lot of things.

Very cool summertime temperatures in Los Osos so Larry can plant hard re winter wheat in July an harvest in November. So he can get two crops of grain in a season. Not in the same field.

Constantly rotating his crops

Grows lentils, fava beans, and peas as a part of this rotation.

Dry farms generally, but summer grown grains do need irrigation, but not a lot.

Millet is a loose term for 5 different genesis.

Performs minimal tillage, just a little to plants grain.

Uses a technique kind of like green manure process with the stalks, he will lay them down and then uses a spring tooth harrow to rip lines and then will plant beans into the lines.

Mark Lundy (UC Davis Cereal Specialist and corn and agronomist)

Agronomic Considerations for small scale grain production

Heirloom vs Modern Varieties – You can quantify the genetics

Modern varieties have more genetic diversity because they have been bringing so much in

Amount of Carbon in Heirloom vs Modern Varieties – Biomass amount is how they track the amount of carbon sequestered in the plant, while heirloom varieties get taller and sometimes have a greater

biomass yield, sometimes the short smaller modern varieties can be planted more densely and therefore there are more plants in an area and in turn more surface area and in turn more biomass (this is a personal summary by Jes)

You can control lodging and weeds by getting the right planting density. Must experiment on your own farm to be able to find out what the optimal planting density is for you.

General Rules of Thumb

-Evaluate your limits

-Water

-Nutrients

Then based on your limits

-Choose your seeding rate

-Get the plant population that is right for the yield you want

Know your soil texture, this will effect fertility

Know your water patterns and average amounts

Water demands and availability and how much your soil will hold is important to understand

When you know texture and structure you can guesstimate how much water will be held

Can estimate evapotranspiration rates

Can research what you observe to better mix science an observation

Can take soil samples

Can do a soil texture test with your hands

Can have different soil types on different parts of the farm

Can sometimes move planting dates to match the times when water will be available

Can strategically place crops around the farm to accommodate different soil textures

Can test for Nitrate in the soil and depending on the amount it can predict the amount of lodging you will have. High nitrates = more lodging.

If you have high nitrates, you can mitigate lodging by using a lower seeding rate, so that there is more tillering and sturdier plants that are less likely to fall over. But must kep in mind that some varieties don't tiller a lot so if you have a lower tillering variety you might want to increase your seeing rate to prevent lodging.

Based on this nitrate test you can figure out how much N you are taking off your field and how much protein is in the plants you are growing.

High Carbon and Low Nitrogen in the soil right before planting will tie up the Nitrogen and lead to low vigor initially.

SEEDING DEPTH MATTERS

Amount of heat and moisture on the seed will greatly influence germination. Good seed to soil contact is important.

Aggregates should not be too much bigger than the seed size for good contact.

When you are testing for Nitrates in the soil, important to use purified water, cause water can have nitrates in it. Use 3 parts water to 1 part soil. Shake for 3 – 5 minutes. There are tester strips that you dip in the water and the test will tell you if you are low – medium – high in nitrates.

Modern Varieties have a big demand for N very quickly while heirlooms tend to not need it as fast.

Taller varieties will have more carbon in it per plant, but if you grow shorter varieties and more plants you will often get more overall carbon brought into your system.

When you intercrop with Nitrogen fixing legumes will not see the benefit until the next year.

Challenges an success' of intercropping with N fixers

Example from the Audience.

Individual grows 20 – 40 acres of grains a year. Mixes N fixers with grains. Located in SLO county, low rain.

When he intercrops, the grain yield may be slightly lower but that the quality of the grain seems to be improved. Easy to separate out the N fixer seed from the grain seed because they are all very different sizes. Why does the quality seem better? Water? Plant population? Compatible plants? Feels that intercropping is an important part of maintain soil fertility on his farm. He rotates the grains as well as intercrops.

Timing with N fertilizer application is very important. N is not available when its too cold. Since most of these grains will be planted in cooler temperatures, and when there are rains that can leech the N from the soil, timing is key. Intercropping can be a tool to help with this fertility issue.

He plants Peas (good N fixers, not good at weed suppression) mixed with clover (good weed suppression) Bell Beans (big competitors) Mixes all the seed together and uses a seeding rate of 100 lbs per acre. If you want to harvest all the seeds together you will have to be careful with the combine because you can crack the beans when you harvest the wheat. If you really want to save seed it is wise to plant a few small patches of only beans to be able to safely harvest.

There is new research showing that N fixers will shunt N into the soil while they are still growing, especially vetch, BUT these studies are also changing plant populations, and if there are less plants then that means more available N for the plants that are there. So it is tricky.

Does not recommend mixing grains and vetch.

Peas at 50% with Barley will take down Barley. So pea at 25% is working better. Peas shatter early and reseed themselves for next year.

Wes Jackson from the Land Institute has a paper on intercropping.

SEEDING RATES ARE REALLY KEY

Important to do seeding rate trials on your farm.

A strategy to prevent lodging is to try to plant a little later so that the plants won't have time to grow as tall. You also see greater disease in earlier planted grains cause they are colder and wetter for longer. BUT if you wait to plant you will probably have a lower yield then the earlier planted crops that sat in the wet cold ground.

When the grain crop enters its first hollow stem, you can see the embryo inside the stem. If you graze below the embryo then the crop is done for. So if you are considering mowing or grazing must be

confident that you will not damage the embryo. If you choose to cut back, you will increase vegetative growth but you will reduce yield. It can also really compact soil if you are not careful about the moisture.

MANAGING RUST

Choose a rust resistant variety. There are genes that are resistant to stripe rust, and these genes are not that hard to breed into your system.

Significantly increased yield in modern varieties.

In an organic system, if you focus on health, you can handle rust, a little rust is ok. If you provide for all of the plants needs it can "fight off" rust. But rust can also be devastating for a crop.

LUNCH BREAK

Seth - Equipment

Bought his equipment from Wisconsin because it was cheaper.

Uses the rotary hoes sometimes at 10 miles an hour with a helmet on and it works well.

The cover crop gets so water logged he is having trouble establishing it. Even if they do manage to est. a cover crop the annual grasses seem to take over.

Last year he flail mowed and that could be why rye grass came hard. Is considering pasture cropping, but there are not a lot of good examples in the area. Would eventually like to take on more reduced tillage techniques. Discing and tilling is kind of like chasing your tail.

Has volunteer Sonoran wheat this year

Planted cereal rye for a distiller, wants the straw for animal bedding.

Interested in experimenting with more spring planting of grain because winter has been tough growing.

Challenging moisture dynamics, timing window is really key at Open Field Farm.

Sonoran wheat awesome an can grow with low moisture.

Inland grain growers maintain a 2 year fallow to hold all of the rain possible and then can get a good crop. Advantages and disadvantages to holding fallows.

Jim Leap shared that that in Salinas they are doing cover crop variety trials, working with growing beds, overhead irrigation.

Best way to plant cereals is to use a drill after weeds have been managed.

Seth feels like in the spring when the soil is drying out he could eventually nail the planting timing.

Consider letting it get a little too dry even and then irrigate a little to get the moisture just right.

Timing of taking the cover crop down is a vital decision. It goes from too wet to, too dry so fast. Initial ground prep is critical and must be careful not to cause compaction. Want to have uniformity and for good drainage and even infiltration.

Seth thinks minimal tillage instead of no till, there are no great till examples in the area.

Larry rips instead of tilling to put his beans in which is a form of no till

Can use tractors to create seed beds, but then have to fight compaction and then need to use other tractors to deal with compaction, chasing tail.

It was suggested to Seth that creating beds might be a good strategy for him to avoid the winter water logging he experiences at Open Field Farm.

Seth has had soil tests done, has spread gypsum, he has high magnesium which locks up calcium. He has tight soil, tight soil is especially difficult in a no till system.

Mark Lundy said observe water patterns and be strategic.

Could take 10 years to know the land well enough to plant in the proper spots where it won't water log. Depth of soil is a factor.

Weeds are an indicator of where there is more or less water on the farm.

Open Field Farm used to be a silage farm before Seth took it over. It was dry farmed. Not pasture. 1 year of rest from that system before they came.

Mustard is the biggest weed they have.

There was a suggestion to Seth that he could consider focusing on rehabilitating the land before thinking about production cover cropping. Increasing OM and lots of roots is what will heal the soil.

Consider using trees and windrows to manage the water.

Darren Doherty of Broadacre permaculture in Australia came out and read the landscape, he did some intense mapping of the land. His suggestions are helpful for the land but he also Ag. Focused and wanted farmers to be profitable from the land as well.

Protein balance in chicken feed is challenging.

Tristan Mechanic and Farmer

Does custom seeding and grain growing for farmers. Ag Phd program is a good resource on planting, can learn a lot about grain farming. Hefty Seed Company is a good resource. UC system has a lot of info for small grains, they have a workbook on how to grow small grains.

When going to plant, select variety then you must ask what is the seeding rate?

Crop and variety will hugely affect the seeding rate.

Choosing certified seed will reduce disease pressure, critical choice.

Soil moisture

Soil temp

Condition of soil

When fall sowing you are waiting for the rain. You get a touch of rain then till then drill in crop. Narrow window of seeding – Oct. 15th – Nov. 15th in this area.

As winter progresses soil temp is dropping and reducing germination. You will need to increase seeding rate to accommodate for decreased germ.

Best defense against weeds is to establish your crop before the weeds can est. Want your crop to emerge first and out compete.

25 days for your seed to emerge.

If you are not seeded by Nov. 15th you will be dealing with erosion.

Timing is key, if you miss the window it is an uphill battle.

In the spring as things are warming you have the opposite battle. If you seed too early still dealing with cool temps and slow germ and weeds beating your crop out. In the spring moisture is a huge consideration. Getting anything planted before April is almost impossible. Getting a fall crop in is safer than spring because you can control more variables. In the spring it goes from wet to dry so fast, tight window. Most grain growers do fall seeded. Must irrigate in spring.

Then must ask yourself. BC? No till drill? Reg. drill? Spacing? Insect and weed pressure?

Wire worm is a major pest, they eat the baby plants, wire worm pressure shows itself as low yield and low germ. Can put out carrots to bait them, if you find them you should treat the whole field. Cucumber beetle chews on root system.

If you choose wider spacing then you will need to plan for more weed management. With thinner rows you end up using the same seeding rate, get taller and lankier, seeming lower yields. Your harvest techniques will be a part of your spacing decisions.

Will need to test different seeding rates as there are a lot of variables to consider.

Once you have decided your seeding rate you can choose your seeding method.

Easiest method is BC but will need to calibrate the swath speed and such.

If you can BC right after discing when the field is still in little triangles then lightly go over it with something then that works well. Goal of seeding is consistency.

Another option is the grain drill. One of the more ideal methods because of its consistency. There are different types of drills. The drill opens the soil and cuts into it so soil moisture key when using it because it can cause compaction you can create furrow that is like a clay cocoon that the seed can't grow in. Drills can be unreliable if not functioning properly can make the trenches too big or too small. Calibration of the drill is necessary. Most have an acre counter on them and can use that or a seed chart, wheel size is a factor. There are a lot of ways to do it. Should do a 100 sqft test of your rate before committing. Depending on the type of drill there are different sprockets and must consider the gear box. When things wear down chains can jump. If the field is uneven then the wheels will be uneven and the seed will be uneven. A broken spring can mess up seeding. Grain prices are so low right now that a lot of growers are selling off equipment for very cheap.

The no till drill was designed in the Midwest for Midwest farmers. The engineers assumed that ppl were using GPS tracking and therefore would be able to seed 3in exactly away from the row that they did the year before. Also it was assumed that you would not need to worry about compacting clay soil. No till drills were designed assuming that the farmer would be using herbicides.

Weed seeds will germ first in no till system, not rec. in Nor Cal small scale grain production generally. But there are potential benefits to no till in the right context.

Some people gave examples of their experiences with no till grains in NorCal. Ken said No till can work in bare ground but tough in pastures. Found No till to work really well. Flail mowed flint corn and no tilled cover crop. No till easier in drier places cause soil moisture is super key to success.

No till drilling in orchard rows is a thing people do.

If you are intercropping then you need to adjust drill to accommodate largest seed size. When you do this you can't really go any bigger than the bell bean size. Beans take more moisture for longer, must keep them saturated and need more heat generally. If you do bed prep super early before rain, then when the rain comes you are ready to plant is a strategy.

Fall is the more optimal growing season in this climate.

Don't be afraid to BC by hand, it is an option. Get a comfortable bucket situation. Then drag something over it like a harrow or a fence. Can use an ATV to drag. Need one person spreading the seed and another making sure that it actually getting into the ground.

Plant population is the goal of choosing the seeding rate, check actual seed weight. Use little flags as targets when you BC to help spread evenly.

Seth – in the field with the rye

Rye planted on slightly higher ground is surviving but majority under water.

Mustard weed seed is fairly easy to separate from grain seed post harvest but vetch is very difficult. Rotation is key to avoiding weeds. You can plant a crop that you are not looking to get dry seed from in a field where there is a weed issue and mow things down before they go to seed.

How to plan a rotation when your fields are different sizes? Harvesting tools effect rotation choices, really need to clean the combine well in between harvesting different crops.

The market often affects the area of grain that you want to grow.

Grazing will pretty much always reduce seed yield. The reason to graze grains is to keep them shorter to be able to prevent lodging, can also encourage more tillering.

If dry farming very important to get the weeds out cause they really compete a lot for water. Want a capillary block so you don't lose water to evaporation.

Can use veggie seeders to plant cereals. Would plant on about 8 inches and it works out for weed management on that spacing.

Mark Lundy showed the hollow stem where the endosperm is and the place where you can't graze below or you will kill the plant. When you graze you are moving the plant back in time, when you move it back in time you are encouraging it to mature in a warmer time so it will grow shorter and not lodge. You have taken away some of its energy and vitality when you graze so it will generally have a lower yield. Will often mature a little later when grazed. When you cut it back you force it to re do its work. When you graze it also sloughs its roots cause it want to equalize its root shoot ratio.

Mowing when there is weed competition is a strategy to reduce weed competition. Flail mower is great for this and doesn't create piles.

Star thistle stays really small for a really long time before it explodes. If you get your grain in earlier, beat the weeds before they set seeds.

There was a guy with bees looking to partner with farmers to let his bees come eat.

Conversation about next meeting

- More about preventing lodging
- How to create markets for individual small scale grain growers?
- Sheer economics of community scale small scale production, how do you afford the equipment?
- More about different varieties
- Group trialing of grains, coordinated on farm trials
- UC Davis and Whole Grain Connection have some variety information.
- There are “best practices” but really just need to learn to be flexible, what worked one year will not work in another year.
- California Thursday, a day when children from schools eat a local meal veggies, grains, meat, dairy
- How do you progressively scale up your grain growing operation?
- Demonstrations of seed cleaning equipment
- Growing grain in between rows in vineyards
- Alternative grains growing processing and eating
- Optimal stage for harvest for optimal nutrition and optimal field curing for nutrition.
- Brewer perspective
- Different mills, advantage of stone mill
- Long term grain storage techniques