

Auglaize County OSU Extension Weekly Agriculture Newsletter – October 2, 2019

Scouting and Latest Information



Field of soybean about ready to harvest



Corn at black layer = maturity



What black layer kernels look like on the cob



What stalks look like of black layer corn



½ milk line corn in a field in low spot



Area of same field, but on high spot



Resulting kernels from plants with no tops = died prematurely, low test weight

Hello!! Good morning! I pray you are well. We received rain this past week!

I now have 4 sellers on the hay list. I now have some oat hay for sale. If you are a buyer and need some hay or have hay to sell, let me know. Call the OSU Extension office at 419-739-6580.

Joke: A farmer and his wife had a fight. What caused it? The farmer asked: Where did you leave the tractor? The wife said: In the Mill field! The Farmer asked: But there's no way into the Mill field. The wife said: ??

Rain fell three days in some parts of the county this past week. Rainfall on Wednesday, September 25th ranged from 0" at 6 locations to 0.1" near Uniopolis. Rainfall on Friday ranged from 0.25" at about 3 miles west of St. Marys to 1.2" at about 2 miles west of Minster. Rainfall on Sunday ranged from 0.1" at Townline – Lima and Wapak – Fisher Roads to 0.75" at about 3 miles west of St. Marys. Rainfall for the week ranged

from 0.61” at Townline – Lima and Wapak – Fisher roads to 1.45” at about 2 miles west of Minster. Average rainfall for the week was 0.96”. Temperatures were warmer than normal for most of the week.

Tasks for the week included: Tillage in preparation for winter wheat and cover crops, harvesting hay and corn silage, seeding wheat, hauling manure, harvesting corn and soybean, and tiling fields.

I drove the county on Sunday.

Wheat – It is difficult to know these days which fields are cover crop and which are wheat fields, but I think wheat has been seeded long enough that it is already emerging and actually looking quite well.

Alfalfa – Due to the rain on Sunday I could not check for insects.

Corn – Corn stage is from R4 (dough) to R6 (black layer) with most of it at the R5 (dent) stage of development. Within the dent stage most corn is at the 1/3 milk line. About 30% of fields are at black layer. With this hot weather corn will dry quickly. Last year at this time 12% of the corn was harvested. I left the corn condition the same this week since we are so close to harvest. The condition last week was 2% excellent, 14% good, 74% fair, 10% poor and 0% very poor. You can see from the photos above that test weights will be low if corn died prematurely for lack of water.

Soybean – Soybean growth stage is from R6 (full sized soybean) to R9 (all pods brown) with most in the north at the R6 (full seed) stage with yellow leaves and most in the south at R8 (brown pods at the top). The crop is maturing rapidly. Last year 29% of soybeans were harvested at this time. I left the crop condition the same crop condition is impacted little at this stage. The condition last week was 2% excellent, 20% good, 64% fair, 12% poor, and 2% very poor.

Weeds – Still time to remove waterhemp from fields! Few seeds have fallen from plants yet.

Insects - I’m now down to just monitoring brown marmorated stink bug:

0 to 3/trap with average of 1.3/trap; Last week was 0 to 0/trap with average of 0/trap

There WERE changes to the Tavium label this past week! There were NO changes to the XtendiMAX, Engenia, or FeXapan labels. The Engenia label still has the most approved products compared to XtendiMAX and FeXapan. No new herbicides were added to the XtendiMAX label this past week, which totals 152 herbicides. No new adjuvant was added the XtendiMAX label, now totaling 344. No new nozzles were added to the XtendiMAX label, which totals 26. No new Drift Reducing Adjuvant (DRA’s) was added to the XtendiMAX label this week, making a total of 58 DRA’s. No new nutritional products were removed from the XtendiMAX label which totals 203. No new products were added to the Insecticides, Fungicides,

Plant Growth Regulator and Other group on the XtendiMAX label which totals 61. No new adjuvants were added to the Engenia label, which now totals 482. No new herbicides were added to the Engenia label, which brings the total herbicide count to 144. No new products were added to the Other category (growth regulators, and fungicides) on the Engenia label, which totals 29. No new insecticide were added to the label which currently has 28 products. No new Drift Reducing Adjuvants (DRA's) were added to the Engenia label, which totals 105. No new nozzles were added to the Engenia label, which totals 29. No new nutritional products were added to the Engenia label which totals 177 products. No new product was added to the pH Modifier group of the Engenia label which totals 16 products. The FeXapan label has many of same the products and nozzles as the XtendiMAX label, but NOT all are the same, so check the FeXapan label carefully. There are 120 herbicides, 49 DRA's, 312 adjuvants, 151 nutritionals, 44 insecticides, fungicides, and others, and 26 nozzles that have been approved for the FeXapan label. There are 13 herbicides, 66 DRA's, 181 adjuvants, and 41 nozzles approved for use with Tavium.

Answer to joke: Wife's response: "There is now!"

Report from Brazil Trip

No further information at this time.

Seeding Cover Crops



Cover crops improve soil health, reduce soil erosion, build soil organic matter, hold nutrients in the soil, increase resilience against soil compaction, provide some weed control, and produce extra forage for fall or next spring. Planting multiple species and maximizing growth before the winter are two important goals of growing cover crops. All species need some minimum time to get established before a killing freeze to maximize the benefits of planting a cover crop. Therefore we are now past the time to seed all broadleaf cover crop species such as Austrian pea, radish, and rape because they require a minimum of four weeks prior to a killing freeze. This leaves winter rye, wheat, winter barley or triticale as the only cover crops that should be seeded at this time of the year. It is even too late to seed annual ryegrass.

Plant the cover crops as soon as possible after harvest as conditions permit to maximize growth. It is critical to plant right away as the forecast is to become wet after October 14th. Planting cover crops beyond November 1st is not desirable as there will not be enough fall growth thus causing more plants to die during the winter. Plant wheat at 1.5 inches and rye, barley, and triticale at 0.75 to 1 inch deep. Planting on the surface at this time of the year is not desirable as there will not be enough time for proper root development to survive the winter.

Drill the cereal crops at 40 to 80 pounds per acre. If broadcasting the seeds and shallowly incorporating, then seed 50 to 85 pounds per acre. If broadcasting over the top without incorporation, seed at 55 to 85 pounds per acre. If planting corn next year, it is best to reduce the seeding rate for winter rye to 18 to 25 pounds per acre to reduce the allelopathic effects to the corn.

All of these species can be harvested for forage next spring. Winter rye will yield the greatest, but wheat will have the greatest nutritional value. Winter rye has the shortest harvest window due to its rapid growth.

Be thinking ahead as to how and when you will terminate the cover crop next spring. When planting corn all cover crops need to be terminated at least 14 days before planting, especially the rye. When planting soybean it is recommended to terminate the cover crop early as well, but some people have been successfully planting soybean into the living cover crop and then killing it.

Harvest Safety



Harvest season has begun in the county! Harvest season is one of the most dangerous times of the year around the farm. Many activities are happening such as combine operation, transporting grain, drilling wheat, filling grain bins, tilling soil, and hauling manure. Because there is a limited window to getting all of these things accomplished, long hours of work happen for much of this time. When fatigue sets in, accidents are more likely to occur.

There are many moving parts on a combine, creating many hazards. When leaving the combine seat, shut off the combine so nothing starts up unexpectedly. Be careful working around the cutter bar. Blow plant residue away from the combine engine and bearings as often as possible, especially if the engine is enclosed. This will reduce the risk for fires. Conditions are currently conducive to combine fires, but that will change later in the week.

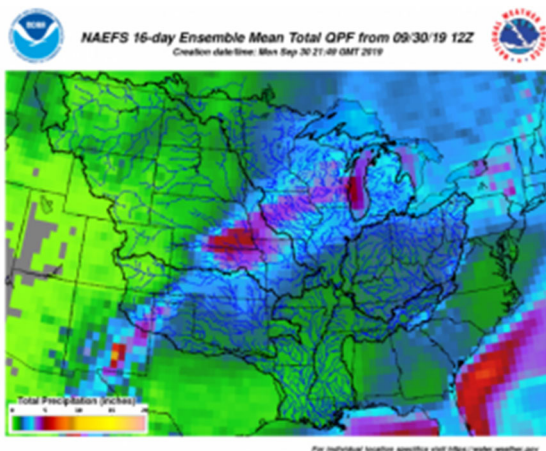
Be sure all lights are working properly on wagons, combines, tractors, and semi tractors and trailers. This is important for preventing accidents with other individuals. It is important that other drivers know where we are and when we may be turning. Wagons are to have a minimum of a slow moving vehicle sign, yellow flashing lights and two types of reflective stickers. It is also recommended to have solid red lights. Carefully climb grain bins and do not enter a bin when the grain is being removed.

Cutting corners is usually when accidents happen, so please think ahead and be safe this harvest season.

C.O.R.N. Newsletter

<https://agcrops.osu.edu/newsletter/corn-newsletter>

October 2019 - Weather Prediction



16 - Day Moisture Forecast

After another hot week (until late this week), a cool down to normal temperatures is expected starting either Oct. 3 or 4 that will last through Oct. 15. Temperatures are expected to return to above normal (but nowhere near current levels) from Oct. 15-31.

Rainfall will be above normal in northern Ohio this week. The week of Oct. 7 will be normal or below normal but confidence in next week's rainfall pattern is low to moderate. Above normal rainfall is in the outlook for the second half of October which could slow harvest after Oct. 15.

The hot and drier pattern for a good part of September was caused in part by tropical activity. The remnants of Dorian created a big low pressure system not far from Greenland while a typhoon called Lingling in the western Pacific created a big low pressure near Alaska. This resulted in a hot and dry dome of high pressure over the Southeast U.S. and wet weather in the western corn and soybean belt.

This pattern appears ready to breakdown later this week.

We are moving into frost and freeze season and overall it still looks like a delayed frost and freeze season. Most see their first freeze by Oct. 10-20. Currently, it still looks like a normal to later than normal first freeze.

The November outlook still indicates a warmer than normal month with precipitation not far from normal (but with a lot of uncertainty). We will keep you posted on this.

Finally, the two week rainfall outlook from OHRFC can be found here:

<https://www.weather.gov/images/ohrfc/dynamic/NAEFS16.apcp.mean.total.png> .

It shows the wettest areas being the western two-thirds of the corn and soybean belt. Rainfall for the next two weeks in Ohio will be 1-2+ inches in northern Ohio but generally 0.10-0.50 inches in southern Ohio. Normal is about 1.5 inches for two weeks.

Author(s):

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Fire Safety During Harvest Season



Combine harvesting soybeans

Meteorologists would likely correct us if we referred to this year's summer climate as bipolar. However, the early fall rain patterns seem to be completely different depending on where one stands in the state. It is either rain, and lots of it – or dry, on the verge of drought. So when readers see an article about fire safety for harvest season, it is intended for those encountering dry and windy conditions, whenever these conditions appear.

October and November are two months where fire is a particular concern. In agricultural areas, fires can break out during unseasonably warm temperatures. Fire risks are particularly a concern around fields with dry crop residues, near woodland areas, or within equipment with heated bearings, belts, and chains. There are several aspects to consider for fire prevention and fire protection during harvest season.

Preventing Combine Fires

Combines are at high risk of fire. Work crews should take extra precautions to prevent fires from starting.

- **Park a hot combine away from out-buildings.** Keeping a combine out of barns, shed, and away from other flammables is a common prevention strategy in case a hot spot ignites. Insurance claims can double when equipment fires are responsible for loss of farm structures.
 - **Regular maintenance is priority.** Check the machine daily for any overheated bearings or damage in the exhaust system. Keep the fittings greased. Maintain proper coolant and oil levels. Repair fuel or oil hoses, including fittings and metal lines, if they appear to leak.
 - **Keep dried plant material from accumulating on the equipment.** Frequently blow dry chaff, leaves and other crop materials that have accumulated on the equipment with a portable leaf blower or air compressor. Be sure to inspect the engine compartment and other areas where chaff accumulates around bearings, belts and other moving parts.
 - **Maintain the electrical system.** Pay attention to machine components that draw a heavy electrical load, such as starter motors and heating/cooling systems. Monitor circuits for any overloading, especially if fuses blow regularly. Keep wiring in good condition and replace frayed wiring or worn out connectors.
 - **Refuel a cool engine whenever possible.** Never refuel a combine with the engine running. It is recommended to turn off the engine and wait 15 minutes; this helps to reduce the risk of a spill volatilizing and igniting.
 - **Prevent static electricity while operating in a dry field.** Use a ground chain attached to the combine frame to prevent static charges from igniting dry chaff and harvest residue, letting the chain drag on the ground while in the field.
 - **Have 2 fully charged fire extinguishers on the combine.** ABC fire extinguishers are recommended on farm machinery. In a combine, keep a 10-pound unit in the cab and a 20-pound unit mounted at ground level.
 - **Have 1 fully charged fire extinguisher in the tractor, grain cart, and pickup truck.** ABC fire extinguishers are recommended on farm machinery. These extinguishers are good for fires at incipient phases – meaning at the first sign of smoke or a small flame.
When a fire appears, it is important to put worker protection before saving equipment.
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- **Have an emergency plan in place and be sure all employees know the plan.** Combine fires happen fast – be sure all employees know what to do if smoke or fire appears.
 - **Turn off the engine.** If in the combine cab, turn off the engine and exit the machine.
 - **Call 911 before using the fire extinguishers.** If the fire is in the cab, only use the 10-pound fire extinguisher from the outside of the cab – on the exterior platform. If the fire is on the ground, use caution

when opening the engine compartment or other hatches as small fires can flare with extra air. Stay a safe distance away from the fire.

- **Use a shovel on small field debris fires.** Throwing dirt over burning field residue can stop a fire from spreading. However, stay back if the fire takes off.

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Late-season Frost Effects on Corn: Grain Production (Adapted from Dr. J. Lauer, Univ. of Wisconsin)

The following is information on the effects of late-season frost injury to corn from an article by Dr. Joe Lauer, Corn Extension Specialist at the University of Wisconsin
(<http://corn.agronomy.wisc.edu/Management/L041.aspx>).

Freezing temperatures before physiological maturity will damage corn. Maturity in corn occurs when kernels form a black layer at the kernel tip, grain will be at approximately 30 to 35 percent moisture. After maturity, no additional dry matter will be accumulated in the seed. In addition to creating quality problems, premature frost will reduce the yield of dry grain.

Temperatures required to kill corn plants

Corn is killed when temperatures are near 32 F for a few hours, and when temperatures are near 28 F for a few minutes (Carter and Hesterman, 1990). A damaging frost can occur when temperatures are slightly above 32 F and conditions are optimum for rapid heat loss from the leaves to the atmosphere, i.e. clear skies, low humidity, no wind. At temperatures between 32 to 40 F, damage may be quite variable and strongly influenced by small variations in slope or terrain that affect air drainage and thermal radiation, creating small frost pockets. Field edges, low lying areas, and the top leaves on the plant are at greatest risk. Greener corn has more frost resistance than yellowing corn.

Symptoms of frost damage will start to show up about 1 to 2 days after a frost. Frost symptoms are water soaked leaves that eventually turn brown. Because it is difficult to distinguish living from dead tissue immediately after a frost event, the assessment should be delayed 5 to 7 days.

Grain quality impact

Late season frost damage can affect grain quality and is directly proportional to the stage of maturity and leaf tissue killed. Severe impacts on grain quality can occur at mid-dough, while moderate impacts are seen

at the dent stage. By the time, the kernel has reached half milk line only minor impacts will occur to grain quality. Differences among hybrids, overall plant vigor at the time of frost and subsequent temperatures will all affect final grain quality.

Other considerations

Growers should monitor stalk rot of severely defoliated plants, which have a good-sized ear. Photosynthate will be mobilized towards the ear rather than the stalk. This could weaken the stalk and encourage stalk rot development. These fields may need to be harvested early to avoid standability problems.

Table 4. Potential grain yield losses after frost.		
Corn development	Killing frost (Leaves and stalk)	Light frost (Leaves only)
Stage	percent yield loss	
R4 (Soft dough)	55	35
R5 (Dent)	40	25
R5.5 (50% kernel milk)	12	5
R6 (Black layer)	0	0
derived from Afuakwa and Crookston (1984)		

Yield impact on frost-damaged corn grain

Yield losses are negligible if frost occurs when grain moisture is below 35 percent. Yield loss is directly proportional to the stage of maturity and the amount of leaf tissue killed. Those who will be advising growers about the likelihood of frost damage and its impact on yield should get ready by consulting the [National Corn Handbook NCH-1 "Assessing Hail Damage to Corn"](#) (Vorst, 1990). This publication has charts used by the National Crop Insurance Association for assessing yield loss due to defoliation. **Knowing how to recognize frost damage and assess probable loss is important for decision making.** An abbreviated version of the loss chart is shown in Table 7. For example, corn that was defoliated 20% at the milk stage would have 3% yield loss.

Table 7. Estimated percent corn yield loss due to defoliation occurring at various stages of growth.					
Stage of growth	Percent leaf area destroyed				
	20	40	60	80	100
	Yield loss (%)				
Tassel	7	21	42	68	100
Silked	7	20	39	65	97
Blister	5	16	30	50	73
Milk	3	12	24	41	59
Dough	2	8	17	29	41
Dent	0	4	10	17	23
Black layer	0	0	0	0	0
derived from Vorst (1990)					

The stem on a corn plant is a temporary storage organ for material that eventually moves into the kernels (Afuakwa and Crookston, 1984). Grain yield will continue to increase about 7 to 20% after a light frost that only kills the leaves as long as the stem is not killed (Table 4).

Frost damaged grain drying rates

Freezing air temperatures sometimes occur in early autumn before grain is physiologically mature ("black layer). Grain drying rates can range from 0.83 to 1.16% moisture less/day (Hicks et al., 1976). Drying rates of grain following leaf blade defoliation or moderate to severe cold treatments are not different from the

drying rate of normally maturing maize grain. Husk condition does not affect grain drying rates. Defoliation and freezing before physiological maturity (R6) causes grain moisture levels to be 2 to 6 percentage points greater than that of grain from control plants when grain from control plants was in the 22 to 30% harvest range. Grain frozen before R6 required 4 to 9 additional days of field drying to reach the 22 to 30% moisture range. Defoliation and cold treatments have little effect on the drying rates of cobs and ears, but moisture levels are greater than those of the control. Loose husks cause faster cob and ear drying compared to normal husks.

Characteristics of frost-damaged corn grain

(<http://www.extension.iastate.edu/publications/PM1635.pdf>).

- Small, misshapen, soft kernels
- Undeveloped starch structure; pithy kernels
- Test weights progressively below 52 lb./bu., depending on maturity (in 1993, some corn was less than 40 lb./bu.)
- Average protein (7.5 to 8.0 percent) in corn heavier than 45 lb./bu., lower protein in corn lighter than 45 lb./bu.
- High breakage susceptibility; many fines generated in handling
- Lower digestibility compared with normal corn, especially for test weights below 45 lb./bu.
- Little or no increase in test weight after drying
- Variable amino acid levels
- Moisture meters generally read low in immature corn. Surface drying of kernels, giving deceptively low (by 1 to 2 percent) moisture readings on dried corn

Recognize that these effects are progressive, with least impact on corn closer to maturity.

Uses for frost-damaged corn

Animal feed is the best use for frost-damaged corn. Low test weight corn used for large animal feed is only slightly less valuable (2 to 5 percent) than normal corn on a per-pound basis. Poultry, however, with limited volumetric capacity, may be more sensitive to frost-damaged corn than larger livestock.

Before feeding, test light corn for protein level, amino acid level, and mycotoxins (especially fumonisin and vomitoxin). Composition will vary. Be aware that fungi invade stressed corn more readily than they do normal corn.

Wet, dry milling, and dry grind ethanol operations will not want frost-damaged corn. Using frost-damaged corn in wet milling causes low starch yields, and the separation of starch and protein cannot be clean. In dry milling, frost damaged corn sharply reduces yields of dry mill grits. Processors will discount light corn

more heavily than its reduction in feed value. Fermentation will be more variable in ethanol production, with lower yields and less predictable distillers grain quality.

Handling and storage of frost damaged grain

Immature and frost-damaged corn will have marginal quality, so it's important to manage equipment carefully to minimize further quality degradation. Set combines carefully, to balance the need to get small kernels with kernel damage. Manage the fines and chaff, which can increase mold problems in storage. Dry grain to uniform moisture levels, a tricky business because harvest moisture is likely to be somewhat uneven after a cold, short growing season. Dry frost-damaged corn at reduced air temperatures (below 160 °F) and store at 14 percent (or lower) moisture. Dry corn as gently as possible, even if it is tempting to crank it up for higher dryer capacity. Also, use slow cooling methods after gas-fired drying to minimize quality problems. If possible, aerate stored grain to cool it to 20 to 30F for winter storage (in the upper Midwest).

Frost-damaged corn breaks easily and goes out of condition quickly, even at low moisture levels. Expect storage life to be about half as long as that of normal corn. Do not harvest through low-lying frost damaged areas. The mixture will be a high storage risk. Harvest and handle them separately.

Because immature corn kernels dry on the surface, expect the moisture level of stored corn to be higher than test results. Expect to aerate the stored corn frequently. Move immature corn to market before summer. Store only clean corn and pull out the fines-laden center core of grain in bins.

References

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Further Reading on handling frost damaged corn:

Early Fall Frost (Extension Specialists, Univ. of Minnesota)

<https://extension.umn.edu/growing-corn/early-fall-frost>

Corn Drying and Storage Tips for 2011 (K. Hellevang, North Dakota State University)

https://www.ag.ndsu.edu/graindrying/documents/Corn_Drying_and_Storage_Tips_for_2011.pdf

Post-Harvest Tips for Late Maturing Corn (K. Hellevang, North Dakota State University)

<https://www.ag.ndsu.edu/winterstorm/winter-storm-information-farm-and-ranch-information1/farm-and-ranch-crops-corn/post-harvest-tips-for-late-maturing-corn>

Author(s):

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Fall Herbicide Treatments – Even More Important This Year?



Winter annuals

If you have never applied herbicide in fall to burn down winter annuals, or done it only infrequently, this might be the year to make an investment in fall herbicides. Fall treatments are an integral component of marestail management programs. They also prevent problems with dense mats of winter annuals in the spring, which can prevent soil from drying out and warming up, interfere with tillage and planting, and harbor insects and soybean cyst nematode. 2019 was a generally tough year for weed control, leading to higher end of season weed populations in some fields. A number of acres were never planted, and growers

got to experience the difficulty in obtaining season-long control in the absence of a crop. Reminds us all how important the crop canopy and shading of the soil is during the second half of the season. Bottom line - there was substantial production of weed seed in some fields, and a replenishment of the soil seedbank by both winter annual and summer annual weeds. The seed of winter annuals and marestail lacks dormancy so above-average weed seed production can lead to an immediate increase in fall-emerging weeds. Applying herbicides this fall can compensate for increased weed populations and make life easier in the spring.

We have published information on fall herbicides fairly frequently, and our suggestions for fall treatments have not really changed much. There is plenty of information on fall herbicide treatments in the C.O.R.N. newsletter archive and on other university websites. Our philosophy on this has not changed much over the past decade. A few brief reminders follow:

1. When to spray? Anytime between now and Thanksgiving will work, and possibly later. We have applied into late December and still eventually controlled the weeds present at time of application. Once hard freezes start to occur, there is usually a substantial change in the condition of certain weeds, such as dandelion and thistle, that renders them less sensitive to herbicides. We discourage applications during periods of very cold weather which can occur starting about Thanksgiving, and also (obviously) when the ground is snow-covered. The generally dry conditions we are experiencing have limited weed emergence so far this fall. We anticipate that rain occurring now that leads to some sustained soil moisture near the surface will likely result in germination and emergence of the weeds that have been missing until now. Our recommendation is to wait for rain and the additional weed emergence before applying any herbicide this fall. The risk in this is that the weather turns wet, making it difficult to apply herbicide. So it's also possible to apply now and include a residual component to help with later fall emergence (which is the exception to the "no residual" recommendation in #4 below), such as simazine, a low rate of metribuzin or Canopy, or a Sharpen rate higher than 1 oz.
2. What about all of the crop residue on the ground after harvest - won't that cause problems? We have not worried about this, and the herbicides seem to work regardless. Most agronomists I have asked have the same impression. On the other hand, it probably wouldn't hurt to wait a while after harvest to let the residue settle down, and the weeds to poke through. Dense crop residue usually prevents marestail from emerging anyway.
3. Don't make it too complicated or pricey. Keep in mind that the primary goal is control of weeds that have already emerged. This is hard to accomplish with a single herbicide, but there are a number of relatively low-cost two-way mixtures that easily achieve this goal. Our philosophy has generally been to start with 2,4-D, and then add another herbicide that results in more comprehensive control. Herbicides that make the most sense to add to 2,4-D based on our research: glyphosate, dicamba, metribuzin, simazine, Basis (and generic equivalents), Express (and generic equivalents), or Canopy/Cloak DF or EX. These allow either corn or soybeans to be planted the following year with these exceptions: simazine - corn next year; Canopy/Cloak - soybeans next year; Basis - possibly restricted to corn based on rate and

geography. We do not see the need for three-way mixtures, although a case can be made to add a low rate of glyphosate to a two-way mix to control grass or improve activity on perennials. A two-way mixture of glyphosate and Sharpen could also be used, but we believe Sharpen has more utility in maretail control programs when used in the spring.

4. Is there an advantage to including residual herbicides? No, because almost all of them dissipate over the winter and fail to provide any control of spring-emerging weeds. The primary exception to this is chlorimuron (Canopy/Cloak), which for whatever reason does persist at high enough concentrations to provide some control in spring. Our research has repeatedly shown that applying other residual herbicides in the fall to get control in spring is a waste of money. The good news here is that any effective fall herbicide treatment with or without residual will result in a weed-free seedbed in spring, usually into April, so that the spring-applied burndown/residual treatment just has to control small weeds that emerge in the few weeks prior to planting. That is the goal.

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Be Aware of Late-Season Potential Forage Toxicities



Alfalfa plant

Livestock owners feeding forage need to keep in mind potential for some forage toxicity issues late this season. Nitrate and prussic acid poisoning potential associated with drought stress or frost are the main concerns to be aware of, and these are primarily an issue with annual forages and several weed species, but

nitrates can be an issue even in perennial forages when they are drought stressed. A few legumes species have an increased risk of causing bloat when grazed after a frost. Each of these risks is discussed in this article along with precautions to avoid them.

Nitrate Toxicity

Drought stressed forages can accumulate toxic levels of nitrates. This can occur in many different forage species, including both annuals and perennials. In particular to Ohio this year, corn, oat and other small grains, sudangrass, and sorghum sudangrass, and many weed species including johnson grass can accumulate toxic levels of nitrates. Even alfalfa can accumulate toxic levels under severe drought stress. An accompanying article in this issue of C.O.R.N. discusses nitrate toxicity potential in corn. Here the other forages will be discussed.

Before feeding or grazing severely drought stressed forage, the forage should be analyzed for nitrates. Many commercial labs provide this service, and the cost is well worth it against the risk of losing animals.

See the following references for more details:

<https://fyi.extension.wisc.edu/forage/nitrate-poisoning-in-cattle-sheep-and-goats/>
<http://forages.tamu.edu/PDF/Nitrate.pdf>

Prussic Acid Toxicity

Several forage and weed species contain compounds called cyanogenic glucosides that are converted quickly to prussic acid (i.e. hydrogen cyanide) in freeze-damaged plant tissues, or under drought conditions. Several labs provide prussic acid testing of forages. Sampling and shipping guidelines should be carefully followed because prussic acid is a gas and can dissipate during shipping leading to a false sense of security when no prussic acid is found in the sample.

Drought stress can affect poisoning risk. Drought-stunted plants can contain or produce prussic acid and can possess toxic levels at maturity. Prussic acid poisoning can be associated with new regrowth following a drought-ending rain, which is likely the case in some parts of Ohio now. Rain after drought plus young stages of plant maturity (see below) could combine to cause toxic levels of prussic acid in forage this year.

Plant age affects toxicity. Young, rapidly growing plants of species that contain cyanogenic glucosides will have the highest levels of prussic acid. Pure stands of indiangrass can have lethal levels of cyanide if they are grazed when the plants are less than 8 inches tall.

Species with prussic acid poisoning potential. Forage species that can contain prussic acid are listed below in decreasing order of risk of toxicity:

- Grain sorghum = high to very high toxic potential
- Indiangrass = high toxic potential

- Sorghum-sudangrass hybrids and forage sorghums = intermediate to high potential
- Sudangrass hybrids = intermediate potential
- Sudangrass varieties = low to intermediate in cyanide poisoning potential
- Piper sudangrass = low prussic acid poisoning potential
- Pearl millet and foxtail millet = rarely cause toxicity

Species not usually planted for agronomic use can also develop toxic levels of prussic acid, including the following:

- Johnsongrass
- Shattercane
- Chokecherry
- Black cherry
- Elderberry

It is always a good idea to check areas where wild cherry trees grow after a storm and pick up and discard any fallen limbs to prevent animals from grazing on the leaves and twigs.

Frost affects toxicity. Cyanogenic glucosides are converted quickly to prussic acid (i.e. hydrogen cyanide) in freeze-damaged plant tissues. Prussic acid poisoning potential is most commonly associated the first autumn frost. New growth from frosted plants is palatable but can be dangerously high in prussic acid.

Fertility can affect poisoning risk. Plants growing under high nitrogen levels or in soils deficient in phosphorus or potassium will be more likely to have high prussic acid poisoning potential.

Fresh forage is more risky. After frost damage, cyanide levels will likely be higher in fresh forage as compared with silage or hay. This is because cyanide is a gas and dissipates as the forage is wilted and dried for making silage or dry hay.

Toxicity Symptoms

Animals can die within minutes if they consume forage with high concentrations of prussic acid. Prussic acid interferes with oxygen transfer in the blood stream of the animal, causing it to die of asphyxiation. Before death, symptoms include excess salivation, difficult breathing, staggering, convulsions, and collapse.

Ruminants are more susceptible to prussic acid poisoning than horses or swine because cud chewing and rumen bacteria help release the cyanide from plant tissue.

According to a Texas Cooperative Extension Factsheet, “Animals consuming forages with high nitrate levels cannot complete the conversion of nitrate to protein, and toxic nitrite levels accumulate. Nitrite is

adsorbed directly into the bloodstream through the rumen wall, where it combines with hemoglobin to form methhemoglobin. Hemoglobin carries oxygen in the blood, but methhemoglobin does not. The formation of methhemoglobin can cause an animal to die from asphyxiation, or lack of oxygen. The animal's blood turns brown instead of the normal bright red. Monogastrics (i.e., horses, mules, swine, etc.) are less sensitive to nitrate toxicity than ruminants. An animal's conditioning affects its ability to assimilate or tolerate nitrates, so consult your veterinarian before feeding forage that contains nitrates.”

(see <http://forages.tamu.edu/PDF/Nitrate.pdf>).

Grazing Precautions

The following guidelines will help you avoid danger to your livestock this fall when feeding species with nitrates or prussic acid poisoning potential:

- Under drought conditions, allow animals to graze only the upper one-third to one-half of the plant or the leaves of coarse-stemmed forages if the nitrate levels in these plant parts is safe. Monitor animals closely and remove them quickly when the upper portion of plants is grazed off.
- Generally, forage nitrate levels drop significantly 3 to 5 days after sufficient rainfall, but it is always safer to send in a sample for testing before grazing or feeding forage soon after drought stress periods.
- Making hay does not reduce nitrate levels in the forage, but the hay can be tested and diluted sufficiently with other feeds to make it safe for animals.
- Ensiling forage converts nitrates to volatile nitrous oxides, or “silo gases”. These gases are highly toxic to humans. Safety practices include removing tarps from a portion of the silo a day or two before removing the silage from the bunker.
- Do not graze on nights when frost is likely. High levels of toxic prussic acid are produced within hours after a frost, even if it was a light frost.
- Do not graze after a killing frost until plants are dry, which usually takes 5 to 7 days.
- After a non-killing frost, do not allow animals to graze for two weeks because the plants usually contain high concentrations of prussic acid.
- New growth may appear at the base of the plant after a non-killing frost. If this occurs, wait for a killing freeze, then wait another 10 to 14 days before grazing the new growth.
- Don't allow hungry or stressed animals to graze young growth of species with prussic acid potential. To reduce the risk, feed ground cereal grains to animals before turning them out to graze.
- Use heavy stocking rates (4-6 head of cattle/acre) and rotational grazing to reduce the risk of animals selectively grazing leaves that can contain high levels of prussic acid.
- Never graze immature growth or short regrowth following a harvest or grazing (at any time of the year). Graze or greenchop sudangrass only after it is 15 to 18 inches tall. Sorghum-sudangrass should be 24 to 30 inches tall before grazing.
- Do not graze wilted plants or plants with young tillers.

Greenchop

Green-chopping will not reduce the level of nitrates and is not likely to greatly reduce the level of prussic acid present. However, green-chopping frost-damaged plants will lower the risk compared with grazing directly, because animals are less likely to selectively graze damaged tissue. Stems in the forage dilute the high prussic acid content that can occur in leaves. However, the forage can still be toxic, so feed greenchop with great caution after a frost. If feeding greenchopped forage of species containing cyanogenic glucosides, feed it within a few hours of greenchopping, and don't leave greenchopped forage in wagons or feedbunks overnight.

Hay and silage are safer from prussic acid toxicity

Prussic acid content in the plant decreases dramatically during the hay drying process and the forage should be safe once baled as dry hay. The forage can be mowed anytime after a frost if you are making hay. It is rare for dry hay to contain toxic levels of prussic acid. However, if the hay was not properly cured and dried before baling, it should be tested for prussic acid content before feeding to livestock.

Forage with prussic acid potential that is stored as silage is generally safe to feed. To be extra cautious, wait 5 to 7 days after a frost before chopping for silage. If the plants appear to be drying down quickly after a killing frost, it is safe to ensile sooner.

Delay feeding silage for 8 weeks after ensiling. If the forage likely contained high levels of cyanide at the time of chopping, hazardous levels of cyanide might remain and the silage should be analyzed before feeding.

Nitrate accumulation in frost forages

Freezing damage also slows down metabolism in all plants that might result in nitrate accumulation in plants that are still growing, especially grasses like oats and other small grains, millet, and sudangrass. This build-up usually isn't hazardous to grazing animals, but green chop or hay cut right after a freeze can be more dangerous. When in doubt, send a forage sample to a forage testing lab for nitrate testing before grazing or feeding it.

Species That Can Cause Bloat After Frost

Forage legumes such as alfalfa and clovers have an increased risk of bloat when grazed one or two days after a hard frost. The bloat risk is highest when grazing pure legume stands and least when grazing stands having mostly grass.

The safest management is to wait a few days after a killing frost before grazing pure legume stands – wait until the forage begins to dry from the frost damage. It is also a good idea to make sure animals have some dry hay before being introduced to lush fall pastures that contain significant amounts of legumes. You can also swath your legume-rich pasture ahead of grazing and let animals graze dry hay in the swath. Bloat protectants like poloxalene can be fed as blocks or mixed with grain. While this an expensive supplement, it does work well when animals eat a uniform amount each day.

Frost and Equine Toxicity Problems (source: Bruce Anderson, University of Nebraska)

Minnesota specialists report that fall pasture, especially frost damaged pasture, can have high concentrations of nonstructural carbohydrates, like sugars. This can lead to various health problems for horses, such as founder and colic. They recommend pulling horses off of pasture for about one week following the first killing frost.

High concentrations of nonstructural carbohydrates are most likely in leafy regrowth of cool-season grasses such as brome, timothy, and bluegrass but native warm-season grasses also may occasionally have similar risks.

Another unexpected risk can come from dead maple leaves that fall or are blown into horse pastures. Red blood cells can be damaged in horses that eat 1.5 to 3 pounds of dried maple leaves per one thousand pounds of bodyweight. This problem apparently does not occur with fresh green leaves or with any other animal type. Fortunately, the toxicity does not appear to remain in the leaves the following spring.

Author(s):

[Mark Sulc](#)

Dry Matter When Making Summer Annual Silage and How to Measuring Its Dry Matter (or Moisture)

To make good silage from summer annuals such as sorghum, sudangrass, and pearl millet, the dry matter concentration should be between about 30% to 40% (moisture contents of 60 to 70%). Silage made wetter can seep which causes a loss of nutrients and potential environmental damage if the seepage gets into surface water (fish kill). Silage made drier will not pack adequately and may heat during storage. In some situations, heat generation can be great enough to start a fire within the silage mass. The drier the silage, the greater the risk for a silo fire. In addition to DM, chopping length of particle size of the chopped forage affects heating risk. Coarsely chopped silage does not pack as well as finely chopped silage, but silage chopped too finely can cause rumen upsets when fed to cattle. Choppers differ but setting the theoretical length of cut (TLC) at about 3/8 to 1/2 of inch will usually produce the correct particle size. Chop length needs to be reduced as the DM at chopping increases.

Measuring Dry Matter

1. Obtain a good sample. The dry matter of leaves will be much greater than that of the stems and the lower portion of the stem will be wetter than the top. The sample must include the total plant that will be chopped. Go into the field (not outside rows) and hand cut 5 to 10 plants at the same height that the crop will be mowed. Chop all the plants using a wood chipper, forage chopper, or by hand.
2. Mixed the chopped sample well.
3. Measure dry matter using one of the methods below.

Koster Tester (Koster Inc., Brunswick OH)

Follow manufacturer directions, but basically you need to accurately weigh out about 200 grams (0.5 lbs.) into the drying container. Record the weight. Dry for about 20 minutes and re-weigh and record the weight. Dry another 5 minutes and weigh again. If weight is the same as the 20 minute weight, the sample is dry. If not, repeat drying in 2 or 3 minute intervals until weight is constant. Calculate DM% as $(\text{Starting weight} - \text{Ending weight}) / \text{Starting weight} \times 100$. Moisture = $100 - \text{DM}\%$.

Microwave

Accurately weigh about 100 grams (0.2 lbs) of chopped forage on a paper plate. Record the weight. Spread it out thinly. Fill a microwave safe mug about half full with water. Put plate and mug into a microwave. Heat on full power for 2 minutes, remove plate, weigh, record the weight and stir the forage. Heat for another 30 seconds, remove, weigh, stir, and record weight. Repeat the 30 second cycle until weight stabilizes. Watch carefully because it can catch fire. It usually takes about 4-6 minutes. Calculate DM% as $(\text{Starting weight} - \text{Ending weight}) / \text{Starting weight} \times 100$. Moisture = $100 - \text{DM}\%$.

Author(s):

[Bill Weiss](#)

Don't Leave Mycorrhizae Stranded in Your Prevented Planting Acres



Saturated soil

What is mycorrhizae, and why should I care?

Mycorrhizae are beneficial fungi that colonize plant roots. They aid plants in scavenging for soil nutrients, by extending the root system via structures called hyphae. In return, plants provide sugars produced during photosynthesis to the mycorrhizae.

Mycorrhizae also produce a protein called glomalin, which glues soil aggregates together to increase soil stability. Overall, this may increase soil tilth, drainage, and the soil's ability to hold onto essential nutrients.

How has the 2019 season affected mycorrhizae levels?

Flooding events this spring have caused many acres to go unplanted – stranding the mycorrhizae populations that require a growing crop for survival. High soil moisture levels have also led to anaerobic soil conditions that are not conducive for mycorrhizal colonization. When mycorrhizae populations are reduced, the crops that depend on them for nutrient uptake can suffer.

What is Fallow Syndrome, and how can I prevent it?

Fallow Syndrome occurs when a lack of plant growth the previous cropping year drastically reduces mycorrhizae populations. Stunting and phosphorus deficiency (i.e. purple leaves) are common symptoms associated with Fallow Syndrome. These symptoms are exacerbated in cool, wet soils that limit phosphorus availability. Reduced mycorrhizal colonization is also correlated with yield loss in corn.¹

The best way to prevent Fallow Syndrome from occurring in your Prevented Planting acres is to establish a cover crop this summer or fall. When selecting a cover crop, keep in mind that Brassicas, like turnip and radish, are not hosts to mycorrhizae, and need to be mixed with either a legume like clover and soybean, or a grass like cereal rye, winter, and oats.

If you have not chosen a cover crop yet, click [here](#) to access a recent C.O.R.N. article outlining the selection process.

Sources:

1Ellis, J.R. 1998. Post Flood Syndrome and Vesicular-Arbuscular Mycorrhizal Fungi. J. of Production Agriculture. 11(2):200-204. doi:10.2134/jpa1998.0200.[Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition](#)

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Other Articles

Hemp Pitfalls and Promise: Alarm Sounded by Midwest Grower

by Chris Bennett

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After four years of growing experience and a host of invaluable lessons learned, Chris Adams is emerging as a leading hemp producer in the Midwest.

(Manstrom Photography)

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Farmer beware. Pitfalls and genuine promise make up a hemp cauldron set to high boil in 2019—yet the temperature will get even hotter, warns producer Chris Adams. “There is no secret knowledge about this crop: The real truth is it’s a crapshoot right now.”

Going no holds barred on profit, genetics, seed costs, mortality, and more, Adams offers a blunt assessment from the front lines of hemp farming, and urges growers toward a hard reality check. “Who do you trust? You better take a hard look because there’s so much going on in hemp.”

Trojan Horse

After four years of growing experience and a host of invaluable lessons learned, [Adams, 32](#), is emerging as a leading hemp producer in the Midwest. He tends a diverse crop roster on 9,000 acres located on both sides of the North Dakota-Minnesota line in fertile Red River Valley soils: sugarbeets, hard red spring wheat, hemp, soybeans, and six varieties of specialty dry beans. Bucking the middleman, Adams also operates an export business, and delivers crops (via containers loaded and sealed on-farm) straight from his fields to the doorsteps of foreign buyers. Convention ranks low on Adams’ priority list and his maverick approach afforded early entry into seed hemp in 2016, soon followed with hemp for CBD purposes.

As hemp acreage cranks up across the U.S., with [78,176 acres grown in 2018](#) and [511,442 acres licensed in 2019](#), Adams sends out a strong warning: “For potential growers or guys just starting, you have to realize there are a lot of scoundrels out there and you’d best be selective as to who you get information from. Also, so many people don’t realize how little they actually know, and others think they know because

they were told by someone else, and it's likely they're banking on false information. When you buy seed and grow hemp, it's very, very important to know you have a good source. I'd guess 80% of the information I see is partially wrong or completely false."



"This is forming into a great, great crop and the pieces will fall in place over time, but I'm already tired of guys pretending to know everything who don't have a clue or who go around whispering about IP secrets. Those kind of guys are everywhere in hemp and they end up costing other farmers money," says producer Chris Adams. *(Manstrom Photography)*

Adams predicts dismal results in many states during the 2019 harvest. "There's going to be a big chunk of CBD acreage that isn't sellable due to genetics or being too hot on

THC. Maybe people don't want to hear this stuff, but that's how it's going to be for a while."

Genetics, Adams contends, is the single biggest hemp concern at present. Feminized seed can cost up to \$1-\$2 per seed, an amount that adds fuel to scam fires. Adams insists fraud is frequent: "When someone pays \$2 for a seed—and that's not a clone or seedling—just a seed, then suddenly every Tom, Dick and Harry is a master breeder, and they charge forward with no proper strains or stabilizing genetics. They plant, fertilize and sell it as feminized seed, make several million bucks, and then you'll never see them again. This type of fraud is real and guys have to know that."

Adams has the battle scars to back his words. In 2018, he bought a batch of clones from Colorado that served as Trojan horses. After planting the purported clones on 3.5 acres of ground and anticipating a good harvest as the plants climbed nearly 7' tall by September, Adams found 2,000 males carrying fat pollen pouches in the field—verboten for CBD hemp which requires all-female production. Salt in the wound, even the plants he was able to harvest from the Colorado source produced an abysmally low CBD level of 1.5%.

“Ignorance can get you leached if you just listen to anyone and start off doomed from the get-go. After this year, guys are going to get more selective, but these problems aren’t just going to go away overnight. Safe to say, bad genetics is going to be a problem for at least several years, and that’s just a single aspect of hemp fraud—there are others.”

Adams views CBD purity claims from a highly dubious perspective, and hopes pending USDA regulation will lay down proper oversight. “I don’t know what is going on with extraction, but I’d bet 70%-80% of CBD products on the shelf are not what they’re labeled. That means a lack of know-how and a lack of integrity. Don’t tell me the crap sold in convenience stores contains real CBD. I don’t know what’s in it, but I guarantee it’s some really Wild West stuff.”

Adams fields six to seven calls per day from potential hemp growers, often asking questions on the basic differences between production for CBD, seed and fiber. “Even now, there are plenty of guys that don’t know the difference. They get offers on seed contracts for CBD production. Sure, you can get CBD from seed hemp, but the CBD percentage is tiny, maybe 1%-2%, but I’m not sure the growers are told that. They’ll have to process into an isolate and it’ll take an unreal amount of plant material to get a good amount of CBD isolate.”

Many of Adams' concerns are echoed by Bob Pearce, a professor of agronomy with [University of Kentucky Extension](#). Hemp production, Pearce explains, is subject to knowledge gaps—a major source of jeopardy for growers. “If a grower is approached by somebody claiming to have all the answers, I see red flags. Right now, we’re relying on limited information backed by solid research, and it’s hard to prove or refute all the claims.”



“If a grower is approached by somebody claiming to have all the answers, I see red flags,” says Bob Pearce. (Photo by University of Kentucky Extension)

Management is a key area where bad hemp advice does heavy damage, Pearce says: “At first, people said hemp didn’t need much attention and it was ideal for marginal ground. No, we have already seen that it needs good ground for real success—lots of care and attention.”

The scramble for seed, potentially lucrative contracts and lack of information can be a recipe for impropriety. “You can’t look at a seed and tell if it’s feminized. Right now, we’ve got a lack of seed certification and lack of knowledge, so people are unfortunately able to commit fraud. I certainly hope that’s not the majority of what we’re dealing with, but you can’t protect yourself if you pretend otherwise.”

Pearce advises growers to ask questions and perform basic research. “Start with simple online searches. In Kentucky, for example, you can go to the department of ag [online](#) and look up approved and cautionary varieties. Ask a supplier to provide proof of a variety meeting THC requirements; maybe results from a certified lab. Sure, somebody could manufacture those on paper, or substitute one variety for another, but in the absence of seed certification programs, those are good starts for due diligence.”

Bottleneck Pressure

Adams currently has 700 acres of seed hemp (half the acreage is for certified seed) and 100-plus acres of CBD hemp, tended by a high school chopping crew to control weeds.

Passing on clones and seedlings in 2019, he spent two weeks preparing John Deere planters to deposit seed for CBD hemp at 99.9% accuracy at 20 acres per hour. By planting seed, Adams knew he faced mortality issues. Seed purchased from breeders is typically hand-cleaned and contains significant impurities (7-10%), he explains.

“Germination is going to be lower out of the gate, maybe up to 10% of your field.

Mortality is an issue because there’s no coating or protectant to put on the bare seed.

That has to change and I’m working on some coatings to make seed more universal in size and help emergence.”



“Safe to say, bad genetics is going to be a problem for at least several years,” says Chris Adams, “and that’s just a single aspect of hemp fraud—there are others.”
(Manstrom Photography)

CBD hemp seed costs are highly variable, and Adams has paid across a range of 70 cents to \$2 per seed. By 2020, as the market dust settles, he predicts prices to drop 50%, easing the bottleneck pressure on populations, mortality and seed costs.

As industrial hemp and CBD hemp acreage increases across the U.S., what about concerns over drift and cross-pollination? Outweighing drift, cross-pollination is a major worry for Adams. “Hemp can be very sensitive to various chemicals or heavy metals, for

example, but we haven't had any problems. In fact, there have been zero cases in North Dakota and Minnesota of chemical residue found in CBD oils."

"As this moves farther along, there is going to be more and more hemp in the fields, and I'm afraid it'll reach a saturation point where outdoor CBD hemp farming is not possible because of all the pollen floating around. In time, I think cross-pollination will be a big issue."

Profit Per Acre

Even with Adams' concerns over multiple facets of hemp farming, potential profits command grower attention. Seed hemp, in his geography, often yields 1,200 lb. per acre but can produce upwards of 2,000-plus lb. per acre. Extrapolating, if the market for seed is 50 cents per pound (subject to consistent fluctuations) and yield reaches 1,200 lb., then gross profit hits \$600 per acre. However, the math changes quickly with big yields, and Adams has cleaned, bagged and dried seed at 2,000 lb. per acre. "I'd say 1,200 lb. is a fair mark and that's what I equate with 70 bu. wheat when you're shooting for 100 bu. All said and done, you can net \$100-\$150 per acre, but that number starts to seriously jump when you have big yields."

Regarding profit potential for CBD hemp, estimates are skewed by considerable variables. For a ballpark figure, assume 1,000 lb. dry material per acre at 8% CBD and a

market paying \$3-\$3.50 per percentage point per pound of CBD. “That’s about \$28 per pound times 1,000, equaling \$28,000 gross per acre. That’s the actual realm of what a grower can get, but that can also be way higher if you yield 3,000 or 4,000 lb. of material per acre.”



Typical production contracts don’t carry much weight in the hemp industry, explains attorney Jesse Mondry: “Standard agreements won’t work because the level of rules and regulations make it easy for farmers and processors to get into trouble.” (Photo by Sara Schafer)

However, grower costs cover a wide spectrum. For example, if population is 2,500 plants per acre at \$1 per seed, the simple math dictates \$2,500 per acre in seed costs. “You’ve

got fertilizer and irrigation costs, and you've got to factor in grunt labor too, and that might be \$200 per acre. There's not a lot of uniformity between costs for hemp farming, but the profit is there if you do it right."

Projecting expenses for CBD hemp is a tricky proposition, particularly since variables change drastically from one operation to another. Industry standards are absent, and everything from planting to harvest can be wildly divergent, even within the proximity of hemp farming neighbors. When Adams began crafting a plan for 2019, intent on mechanized harvest, he penciled out sobering, but realistic input expectations for a roster of expenses: seed, land rent, fertilizer, irrigation equipment, labor, harvest equipment, and more. "Seed costs were extreme for 700,000 plants; \$15,000 for drip; \$30,000 for a well and pump; labor at maybe \$125,000; \$80,000 for tobacco equipment to cut the plants upright and set them on trailers. The more mechanized your harvest, the more CBD percentage you lose, but you also don't want to hand-harvest hundreds of thousands of plants." (In addition, Adams says growers should consider bucking machines to debud plants, stem trimmers and driers—all with hefty price tags.)

Permissible THC (tetrahydrocannabinol; a psychoactive chemical) levels within hemp vary between states, a hurdle Adams contends is a major problem for growers. "It's red tape that really hurts and is going to screw over a lot of farmers. For many states, the level has to be below .3%, but the state testers sample the top 2" of vegetation—which

contains the most concentrated levels of THC in the entire plant. A true sample should include the whole plant grinded up. The limit should be raised to 1%.”

The THC issue is far more than a red light versus green light test to gain state approval—it is a ball-and-chain drag on yield, Adams contends. “To get in under the state’s prescribed THC restrictions, you might have to harvest a month earlier to ensure you don’t rise above .3%. Just one month is a lot of pounds and a lot of percentage. For farmers, that means money left on the table, just because you have to navigate around the THC testing roadblock.”

The Gold Rush

How long might hemp production be subject to song-and-dance activity? A quick buck is a powerful catalyst, but [Jesse Mondry](#), an attorney with Harris Bricken, and head of the firm’s Portland litigation team, believes improvements will take hold in fast time. “We’re dealing with a gold rush mentality, but as the hemp industry matures, the bad actors will get weeded out. The level of expertise of producers, processors and lawyers is going to get better very quickly.”

Fly-by-night hemp visions will lose ground to legitimate players, adds attorney Nathalie Bougenies of [Harris Bricken](#). She warns of a heavy reliance on verbal agreements—a major risk to growers—and emphasizes the necessity of written agreements with

detailed expectancies on CBD and THC levels, along with certificates of analyses from respected laboratories. “You need a clause in the agreement that makes the seller liable to reimburse the buyer.”



“Ignorance can get you leached if you just listen to anyone and start off doomed from the get-go,” says Adams. (*Manstrom Photography*)

Bougenies notes a consistent lack of documentation with many clients, and urges growers to maintain a solid paper trail. “From the get-go, you’ve got to understand who you’re dealing with as far as licenses. Jurisdiction, chain of custody, compliance with

state testing, purposes of the CBD related to rules and regulations, and much more have to be considered. First and foremost, focus on documentation in order to assess whether you are going into business with someone you can trust, and you have to insist on that documentation up front.”

Typical production contracts don't carry much weight in the hemp industry, [Mondry](#) advises. “Standard agreements won't work because the level of rules and regulations make it easy for farmers and processors to get into trouble.”

Escrow may be a layer of protection for growers to consider, with payment for seed or clones completed after contractual obligations are met. “You can pull your money out of escrow instead of filing a lawsuit. That's a protection option you may need when there are shady characters in this industry and something that farmers have to think about,” he says.

“There is so much opportunity in hemp, but also lots of risk, because of a changing regulatory environment and a lack of established farming, contract and business practices,” Mondry adds. “Hemp sits entirely in its own basket and you cannot approach it as just a new commodity.”

Eyes wide open, Adams is bullish on hemp, but insists growers approach the new crop with caution. “This is forming into a great, great crop and the pieces will fall in place over time, but I’m already tired of guys pretending to know everything who don’t have a clue or who go around whispering about IP secrets. Those kind of guys are everywhere in hemp and they end up costing other farmers money. Do your homework and don’t settle until you find people you can trust.”

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