

## **Burr, White, Red, Chinkapin, Gambel, Holly (*Quercus macrocarpa*, *alba*, *rubra*, and *muehlenbergii*)**

**Notable Features:** Flour mixes well with wheat but won't fuel yeast or sourdough bacteria/fungus. European is most productive but not resistant to native disease. Red oak is rich in oil and protein. Whites are 5-10% oil. Red oak is 7.5% oil. Black oak is around 25%. Black oak has fuzz on the buds, pin doesn't; Black and pin only like acid soils; red can do well on basic soils. Bicolor x Burr is called xSchuettei and is tolerant of alkaline. Bur oak is very hard to dry without spoiling; black oak the easiest and best pretty easy.

Oaks can take a month to fall to the ground after ripening so a knocking stick or climbers would often be used to shake down acorns early so as to have time for other time-specific fall harvest tasks. Fire, smoke, lack of fall debris, or lime may kill acorn larvae; some certainly clear the ground with fire for acorn picking; some definitely burn after acorn drop. Sound acorns drop after infected acorns but exit to debris after sound acorns drop.

Reds are found in wetter areas and north slopes. Burs on south slopes and ridges. Whites on flat land between the two. Blacks tend to be with white oaks.

Tannins may become fixed in white oak when acorns sprout in fall; tannins will fix if boiling hot and then placed in cold water. They take about a week to sprout. Deer strongly prefer low tannin oak. Red produces acorns over 2 year period so production losses due to frost usually happen the year after white oak group plants.

Swamp White usually will not tolerate alkaline soil. Most fibrous roots. Chinkapin only bears every 6-7 years here usually. Often don't harden off fully in fall. Only seen at old native sites. Very rare in WI. Could be used for chicken and wild bird feed due to small acorn size

Condensed tannins are measured by transparency at 530nm (green) after adding Insoluble iron (this was 98% of tannins in holm oak). Hydrolysable tannins are the other type and they tend to have positive health impacts.

$\%tannin = 0.052 * OpticalDensity * Vol(mL) / Weight(g)$

Chestnut Oak (7.8-10.4% Tannin)

Red Oak (7.4-9.8% Tannin)

White Oak (4.4-5.6% Tannin)

Valley Oak (3.5% Tannin)

Bur Oak (2.5% Tannin)

Chinkapin Oak (% Tannin)

Holm/Holly Oak (0.30% Tannin) - Has richer flavor than bur oak. Oikos has a BurxHolm

crude protein	crude fat	crude fiber	Si	Ca	P	ash	N-free extract
percent dry weight -							
5.9	4.3	18.7	0.01	0.15	0.09	---	---
4.6	5.8	18.6	0.06	0.18	0.09	2.7	68.3

Red was preferred by native peoples for winter storage ability some say. Low tannin, productive, red oaks have not been selected to my knowing. Hershey didn't mention in his catalogue but had many.

Gambel oaks can grow at Buzz's BurxGambel can look similar to Burr and are fully hardy

1	<i>Quercus</i>	oak	534	C
2	<i>Prunus</i>	cherry; plum	456	
3	<i>Salix</i>	willow	455	
4	<i>Betula</i>	birch	411	
5	<i>Populus</i>	poplar; cottonwood	367	
6	<i>Malus</i>	crabapple	308	
7	<i>Vaccinium</i>	blueberry; cranberry	294	
8	<i>Acer</i>	maple	297	
9	<i>Alnus</i>	alder	255	
10	<i>Carya</i>	hickory	235	
11	<i>Ulmus</i>	elm	215	
12	<i>Pinus</i>	pine	201	
13	<i>Crataegus</i>	hawthorn	168	
14	<i>Rubus</i>	blackberry; raspberry	163	
15	<i>Picea</i>	spruce	150	
16	<i>Fraxinus</i>	ash	149	
17	<i>Tilia</i>	basswood	149	
18	<i>Pyrus</i>	pear	138	
19	<i>Rosa</i>	rose	135	
20	<i>Corylus</i>	filbert	131	

## Notable Varieties:

**Lint White Oak** - Won the original TVA competition and had zero perceivable tannins. Eliza just found it.

**Stound** - AAA - One of Hershey's favorites. Very very fast growing and incredible nut flavor comparable to Japanese chestnut

**Oxford** - AA - Slight tannins. Incredibly heavy crop

McMillen - A - Bumper years and variable seedling growth speed

Ashworth - Hershey Has. Burr.

Kreider - Low tannin Oak

Juicy Hog Biscuit - Eliza has said it is a chinquapin but also has said it is burr

Bad: London Grove

## Breeding Goals:

### Growing Notes:

**A-sexual Propagation:** Grafting is pretty easy for White Oak for Buzz. Swamp white oak is not a compatible stock. You can graft hickory walnut and oak with dormant buds even if there are no alive buds. Red Oak group has delayed graft union failure that is caused by the iso-peroxidase isozyme that is genetically controlled and can be reduced, but only eliminated via controlled crosses of same type parents, via grafting to seedlings.

**Sexual Propagation:** White oak group acorns sprout in the fall when they hit the ground. Ken Asmus says growth vigor is strongly related to precociousness in oak. Large healthy leaves means larger fruit and more precocious (this is true for plum too); Luther Burbank noted this.

### Transplanting:

### Processing:

Bur oak Acorn processing notes from Alex in 2021:

- Acorns with caps can go through the cracker to crack to halves but it takes a more time and force
- After floating acorns once, the acorns must be dried before processing further otherwise the meats will stick in the shell more, the shells don't float very well, and winnowing doesn't work as well.
- With uniform acorn size and the right number of washers, the caps can be cracked off with most of the shells uncracked but it will crack some shells
- Good nut meats and some bad black nut meats will both sink but not that many
- Nutmeats oxidize and bruise quickly so picking out bad nutmeats should happen right after cracking to halves
- The larger the acorn the better because contaminants are proportional to meat size so picking through takes less time.

- My recommendation for cracking process to try:
  - Option I: 1. Dry for a week on a mesh shelf so worms fall through 2. Set the Davebilt to crack nutmeats to halves 3. Agitate nutmeats so the shells and skins fall off 4. Winnow out skins and many shells 5. Float remaining shells and bad meats 6. Pick out bad meats and shells
  - Option II: 1. Process acorns of the same size together (same tree likely) 2. Set the Davebilt to take off the caps without cracking shell 3. Float test and discard floaters 4. Dry with a cloth 5. Air Dry for a week on a mesh in case there are worms to allow them to drop through 6. Set the Davebilt to crack nutmeats to halves 7. Agitate nutmeats so the shells and skins fall off 8. Winnow out skins and many shells 9. Float remaining shells and bad meats 10. Pick out bad meats and shells

White oak acorns must be cured right away. 99% of Shells float in water while meats sink for Red. Dried meats can be stored in jar (to repel grain moth) for years. Cold water is best to keep starch for jellies and breads. Must pour off water at least 1x a day to make sure it doesn't spoil. Starch settles on the top of the water when leaching and is good for thickening. Testa husk in shell is high tannin and will always be bitter if left on while leaching.

Ideal processing will likely be similar to the European chestnut in France:

After the first chestnuts are sold the rest of the crop is gathered without much hurry. After that what remains on the ground is picked up by sheep and goats who greatly relish the chestnut in spite of its natural defence. The gathered chestnuts are then dried. For this a small two story building is used. A slow fire of chestnut logs is made on the ground floor; on the second story the chestnuts are spread about one foot deep. The heat and smoke pass through the cracks of the floor, through the chestnuts and creep out through the tiled roof. There is no chimney of any sort. Pictures of these "smoke houses" may be found in the excellent "Monografia sul Castagno" by Piccioli. It takes about two or three weeks to dry the chestnuts.

After the chestnuts are dry they are shelled. This part in the life of the chestnut has been modernized. The shelling is done by a machine, the only machine used in the yearly cycle of the chestnut. The machine usually arrives unexpectedly, dragged by a mule, the mule being pulled by the owner of the contrivance. After a few glasses of wine the owner is sufficiently revived to crank the one cylinder engine and start a most impressive noise. The principle of

**Super Helpful Acorn Info From Sam Thayer:**

ACORNS

[Sam Thayer](#)

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As one who processes and eats 15-30 gallons of acorns annually, who has studied the use of acorns extensively, and who teaches workshops on using acorns as food, I would like to share some of my knowledge and clear up a few misconceptions.

1. Acorns do not have a set pattern of “on” and “off” years. Their productivity is primarily determined by the weather at the time of their flowering. It is also affected to a lesser degree by previous crops, since these affect the tree’s use of energy as well as levels of insect pests.
2. Tannins do cause the bitter flavor of acorns, and the red/black oak group does tend to have more tannin, but that is not why the red oaks taste so much more bitter than the white oaks. The difference in bitterness is primarily due to a difference in the physical structure of the flesh of the acorns of the two groups. The tannin in acorns of the red oak group readily dissolves in your saliva, while that in acorns of the white oak group does not. Thus, you taste much of the tannin in red oak acorns, and little of the tannin in white oak acorns. This is primarily what accounts for the difference in flavor between the two groups.

In two different tests, the percentage of tannin in the composition of northern red oak *Quercus rubra* acorns was 9.8% and 7.4%; for white oak *Quercus alba*, 5.6% and 4.4%; for chestnut oak *Quercus prinus*, 10.4% and 7.8%. (Statistics from Karl Petruso and Jere Wickens, “The Acorn in Aboriginal Subsistence in Eastern North America” in *Experiments and Observations in Aboriginal Wild Plant Utilization in Eastern North America*, 1984, Indiana Historical Society.) Note that chestnut oak, a member of the white oak group normally touted as “sweet and edible” (and often as the most sweet and edible acorn in the East) contains more tannin in these samples than does red oak. And while white oak contains significantly less tannin than the other two, it tastes remarkably similar to chestnut oak and not at all like red oak. Furthermore, one who has tasted both white and red oak, on account of flavor alone, might suppose that red oak has twenty times as much tannin, so much does it exceed white oak in bitterness - but in fact it contains less than twice as much. It is obvious that the bitterness of acorns is not primarily determined by the level of tannin they contain.

As further evidence that the flavor is determined by a difference in physical structure, **notice how white, burr, or chestnut oak acorns often taste pleasant fresh from the tree, but terrible when ground and boiled into mush; the grinding and cooking physically releases the tannins that were previously locked up**, probably in hydrophobic vacuoles - cavities that repel water, and which often hold tannins in starchy plant structures. You will also notice that shelled red oak acorns dry in two to three days at room temperature, while burr oak acorns under the same conditions require as many weeks. Acorns of the white oak group will become “rubbery” when they are partly dried; red oak acorns do not. When dried, white oak acorns are very hard, like corn, while red oak acorns are softer, like wheat. Boiled white oak acorns never become as soft as boiled red oak acorns. Obviously, there are significant physical differences between the two groups of acorns. In the white oak group, the tannins are still there; you just don’t taste them as much.

3. Acorns from the white oak group do not make better-finished products than those from red oaks. When properly leached, all of the tannins should be removed, not just some of them.
4. Don't expect acorns to taste like "nuts." None of their traditional uses resemble those of walnuts, hickory nuts, hazel nuts, etc. That expectation will surely foster disappointment. Instead, think of them as a basic starchy food, like wheat, corn, or potatoes.
5. Native Americans did not, as a general thing, show preference for white oak acorns. In various places they used one type, the other, neither, or both. The limited records that we do have show that in many and perhaps a majority of cases, those who subsisted heavily on acorns preferentially used those of the red oak group.
6. Deer, turkeys, and squirrels do not "eat up all the white oak acorns and then move on to red oaks" as hunters and others frequently claim. It appears that this is what happens simply because the white oak acorns fall first, and because they sprout immediately after falling. Of course they will be eaten first. White oak acorns, upon sprouting, become unavailable and/or lose nutritional value. They do not store well like other nuts, so squirrels eat them immediately and store other kinds. The main consumers of acorns, however, are deer. Deer die when their teeth wear out. They like to eat acorns before they sprout because the sprouts (roots go down first) have much clinging dirt and sand, which wears down teeth. Red oak acorns remain perfectly intact until spring, so it makes sense for animals to eat them later regardless of preference. As far as I have seen, nobody has presented any real evidence that any game animals have any preference for acorns of the white oak group over those of the red oak. Studies have shown, however, that gray squirrels prefer the acorns of red oak to those of other oaks (Allen Lewis, *American Midland Naturalist* 107).

There are two significant reasons that deer, bears, and other animals might prefer acorns of the red oak group: they are higher in calories, and their softer structure would make them easier to digest. I have pretty clear evidence that, at least under some circumstances, this is the case. A few years ago, I gathered acorns in a particular forest on September 28. There was a very heavy crop of both red and white oak acorns, but the red oak was a much less common tree in the area. I picked white oak acorns because they were beginning to sprout. I returned on November 1 to gather red oak acorns. To my surprise, the ground was still covered with white oak acorns, but every last red oak acorn was gone. There is no explanation for this except that the deer preferentially chose red oak acorns over those of white oak.

The moral of this is that deer do not choose what to eat according to what tastes good to humans. Also, a human eating a wild crop pays much keener attention to that crop than anybody who does not eat it can possibly imagine. If you are planning on planting oaks for wildlife, a mixture of species is the best, but red oak should be your first choice. It is just as suitable for wildlife as white oak, and it produces larger and more consistent crops of acorns.

## About Processing Acorns

The first step in any acorn processing is shelling. Donna Henry was right: don't waste your time trying to crack a large quantity of acorns unless they are dry. I dry mine completely, that way they shrink and practically fall out of the cracked shell instead of having to be pried out like fresh, moist acorns. After the acorns are dried, I put them on a towel laid on a hard floor. The purpose of the towel is to keep the acorns from flying around the room and rolling out of place. I arrange them in rows of pairs, each pair about three inches apart, and crack them with a thin, six-foot post that I call a stomper. I thrust the stomper gently downward onto each pair of acorns. This sounds complicated but it's not; it is easily ten times as fast as using a nutcracker or hammer.

Most people who use acorns use those that are partially leached or not leached at all - particularly with those of the white oak group. Most commonly the acorn meal is used in sweet breads and other baked goods. I have read hundreds of acorn recipes, and in the vast majority of them acorns constitute only a small fraction of the ingredients. Mixed with flour and other ingredients and masked by sugar, the tannin is acceptable to the palate in these applications. Such partially leached acorns would not be acceptable to eat in significant quantities, however.

I generally use acorns as the centerpiece of a meal, and often make products out of nearly pure acorn flour. The quick and incomplete leaching methods that most people employ would be unacceptable for these uses, and the fact that people have all too often tried to get by with them when making a meal out of acorns is one reason why acorns are generally disdained as a marginally edible survival food. In fact, acorns can be perfectly acceptable everyday fare that almost anybody would like. The fact that I expect my acorn products to live up to such a standard is why I leach them for longer than most other people suggest.

I leach my acorns in three separate ways, all of which produce completely different products. The purpose of leaching, of course, is to remove the tannin, which makes the acorns bitter. Tannin is a very large, acidic molecule that is water-soluble, and it is present in some level in most plant foods. In large quantities it is distasteful and can be harmful.

The first method is hot leaching. I boil the acorns, however they come out of the shell (usually in halves or quarters) and repeatedly change the tannin-rich water until the acorns are not bitter. This is usually 12-18 water changes over the period of at least 16 hours. Obviously, this is impractical on a regular kitchen range, but it is quite convenient on a woodstove. Most people take the acorns off sooner, pretending they taste just fine, and are later disappointed that acorns don't taste very good.

Acorns prepared this way are soft and dark brown. I love them in chili in place of the beans. I also dry them, grind them into flour, and mix that with wheat flour in baking.



Cold water leaching is sometimes preferable, as it requires less energy, but since tannin does not readily dissolve the acorns must be finely ground to increase their surface area. This is what Donna described. (You cannot hot-leach finely ground acorns, or they will turn to slime!) I mix the finely ground meal with water, let it settle until the acorn is resting as sediment on the bottom, and then carefully pour off the water. Then refill the water and repeat the process, until the meal is no longer bitter. Don't sit around and wait; go do something else and then come back later. For the last several changes, I wait at least a day before pouring off the water.

Since this isn't a cookbook, and cooking with cold-leached acorn meal is a little tricky and absolutely foreign to all but a handful of people, I really can't tell you here what I do with it. Let it suffice to say that I make a sort of tofu-like or cheese-like product that is very filling, tasty, and has lots of culinary uses.

I also process acorns with an alkali solution, much as grits are made. I have used lye with great success with red oak acorns but have not yet tried lime or using white oak acorns. You did not misread that; I use lye, the same stuff that comes in a can with a skull and crossbones and is used as a drain cleaner, to process acorns. Lye (NaOH and/or KOH) was traditionally used for this purpose by Native Americans and Japanese, and probably in most places where acorns were eaten. This chemical has a long history of use in the processing of many foods, including hominy, grits, olives, and lutefisk. Like fire, it can be harmful when misused, but when a few simple precautions are heeded it need not cause fear.

First of all, lye is very caustic; it can destroy proteins and starches, turning them to mush. That includes your eyes, skin, mouth, and throat. Be careful not to splash lye-water on yourself; if you do, rinse it off thoroughly. Only mix lye with cold water. The good news about lye is that you can taste it; it is extremely bitter like soap. If your acorns are not bitter, there is no lye left in them. Taste them cautiously the first few times you make grits. Before you pronounce your batch of acorn grits finished, stir it thoroughly to get rid of any clumps, and then taste for bitterness. Err on the side of caution. The second thing to remember about lye is that it does not become a systemic poison; a trace of it in your food will turn into salt and water when it hits your stomach. (But your acorns will not contain lye if they are done properly.) The most important caution is this: keep acorns that contain lye during soaking out of the reach of children, and well labeled so some curious adult does not taste them.

For processing acorns with lye I use coarsely ground meal, with particles about the size of couscous. First, I soak the meal in cold water, draining off the water and changing it several times over the course of a day as with cold leaching. This gets rid of most of the tannin. I'll take about a quart of acorns in a half-gallon of cold water in a gallon glass jar and then add about a teaspoon of granulated lye. I stir in the lye and then let the meal soak overnight. The lye will neutralize the remaining tannin and turn the water black.

I place cheesecloth over the mouth of the jar and attach it with a rubber band. This allows me to pour water out of or into the jar without losing any acorn meal. Then, I pour out the inky water, and pour in new water, rinsing repeatedly until the water is clear. I let the acorns soak in clear water for a day or two, changing the water a few times just to be safe before tasting the acorn meal. Using more lye in the beginning will soften the acorns considerably and turn them to a cream or yellow color.

These acorn grits are excellent served like corn grits as a breakfast cereal. They are the mildest in flavor of all acorn products, and most people are utterly astounded that they are actually eating acorns when I serve it to them. Like most hot cereal, I like mine with a little bit of maple syrup and some hickory nuts.

So yes, there are many things that can be done with acorns. When prepared properly they are in fact delicious, and we are only beginning to uncover the possibilities. Like most starchy foods prepared from scratch, acorns require some effort.

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