

# Michigan Chestnut Management Guide

# 2023



This work is supported by the Crop Protection and Pest Management Program [grant no 2021-70006-35450] from the USDA National Institute of Food and Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

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### **Information presented here does *not* supersede the label directions.**

The efficacies of products listed have not been evaluated on chestnuts in Michigan. This information is for educational purposes only. Reference to commercial products or trade names does not imply endorsement by MSU Extension or bias against those not mentioned. To protect yourself, others, and the environment, always read the label before applying any pesticide. Although efforts have been made to check the accuracy of information presented. It is the responsibility of the person using this information to verify that it is correct by reading the corresponding pesticide label in its entirety before using the product. Labels can and do change.

For additional chestnut management information, visit [www.chestnuts.msu.edu](http://www.chestnuts.msu.edu)

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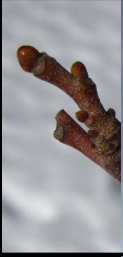











# Chestnut management calendar

Approximate timing of chestnut production management activities in Michigan												
Approximate Date	Jan-Mar	April	May		June		July	Aug-Sep	Sep-Oct		October	Nov-Dec
Crop Stage	Dormancy	Bud swell	Bud break	Leaf expansion	Shoot elongation and catkin development	Female flower bloom and pollen shed	Bur formation and catkin senescence	Kernel development	Bur splitting	Nut drop	Leaf senescence	Dormancy
Pruning												
Irrigation repair												
Manage for black stem borer*												
Adjust tree stakes*												
Remove tree guards*												
Seed cover crops												
Early season weed control												
Soil sampling												
Spring tree planting*												
Apply needed fertilizer/amendments												
Scout for pests												
Tissue testing for nutrients							Late July					
Crop estimate								After nonviable bur				
Fall tree planting *												
Prepare for harvest												
Harvest												
Install mouse guards*												
Paint trunks												
Winterize irrigation system												

\* Applicable only in immature orchards.



# Chestnut pest scouting calendar

Michigan Chestnut Pest Scouting Calendar												
	Dormancy	Bud swell	Bud break	Leaf expansion	Shoot/catkin development	Pollen shed	Bur formation	Kernel development	Bur splitting	Nut drop	Leaf senescence	Dormancy
												
Insects												
Black stem borer*		+	+	+	+	+	+					
Asian chestnut gall wasp	+	+	+	+	+	+	+	+	+	+	+	+
Potato leafhopper		+	+	+	+	+	+	+	+	+	+	
Chestnut weevil		+	+	+	+	+	+	+	+	+		
European rose chafer				+	+	+	+					
Japanese beetle						+	+	+	+			
European red mite	+	+	+	+	+	+	+	+	+	+	+	+
Lecanium scale	+	+	+	+	+	+	+	+	+	+	+	+
Disease												
Chestnut blight	+	+	+	+	+	+	+	+	+	+	+	+
High risk, monitoring and control may be required												
Less risk, monitoring or control may be required												
+ Potential pest activity or visibility, monitoring should occur												
*Pest of trees less than 2.5 inches in diameter, particularly young trees under transplant stress.												

## Chestnut nutrient management considerations

Nutrient management in chestnut trees is unique among perennial tree crops. A complete fertilization program based on soil testing, annual leaf analysis and observation of tree growth will maximize the establishment and development of chestnut trees. Many soils in Michigan provide nutrients in sufficient levels for chestnut production. However, before planting it is recommended that growers do a soil test. A soil test provides you with valuable information on soil pH, texture and nutrient status. Chestnut trees require well drained soils and a pH of 5.0-6.5. Even though optimum nutrient levels for phosphorus, potassium, calcium and magnesium are not known for chestnuts, a soil test can provide you with information to base your nutrient and sulfur or lime addition decisions. To get your soil tested, Michigan growers can contact their local MSU Extension office or the Soil and Plant Nutrient Laboratory by calling 517-355-0218 or visiting [www.spnl.msu.edu](http://www.spnl.msu.edu) for soil testing instructions and costs.

### Nitrogen Management

Nitrogen is an essential nutrient and plays an essential role in many plant functions and fertilizer application is a necessary part of your orchard maintenance as the nitrogen status of a tree can have a profound effect on health and vigor. When considering how much nitrogen to use, more is not necessarily better. Excessive nitrogen fertilization will over-invigorate vegetative growth on bearing trees, which will result in reduced flower bud formation and reduced fruit yield. It is important to provide enough nitrogen to maintain healthy nutritional status, but to not oversupply nitrogen. Fertilizer use during the first year is not recommended and may cause damage to roots. Fertilizer recommendations for years 2-5 are based off better-studied systems, including apple. After the fifth year, tree vigor and health as well as trunk diameter are used to determine fertilizer rates.

### Fertilizer timing and placement

There are several standard ways available to apply nitrogen and other nutrients to your trees in your orchard and probably dozens of less than standard ways that work. The guidelines below are based on soil application of the nitrogen. While some people may apply it to the leaves, there is no precedent for foliar applications on chestnut.

The timing of nitrogen fertilizer applications to the soil surface influences the type of response that trees are likely to exhibit. With most tree crops, early season growth potential and strength of flower buds are largely determined by the nitrogen reserves that the buds contain when growth begins that season. This is a standard statement used for most fruit trees. However, most fruit trees flower in the spring. Chestnut flowers in the very late spring or early summer. We may be able to have some influence with our spring nitrogen application on the strength of the flower bud with spring application of nitrogen.

With most tree crops, nitrogen fertilizers applied during the dormant season as soon as the snow clears will stimulate vegetative growth and generally do not influence the nitrogen status or strength of current season flower buds or fruit set. This may be true for chestnut, too.

Applications during the summer, particularly after current season shoot growth has been completed, are more likely to result in improved nitrogen status of the buds for the next season. However, applications of nitrogen late in the summer may delay or reduce fruit development, increase the pre-harvest fruit drop, delay maturation of buds and woody tissues and/or stimulate late season growth, thus increasing susceptibility of woody tissues and buds to cold injury. In regions where cold injury is of concern, summer applications of nitrogen must be carefully managed to ensure the tree properly shuts down in preparation for winter. Fall applications of nitrogen may delay hardening of buds and woody tissues and increase the potential for desiccation during the winter, particularly if made before trees have become completely dormant.

For most efficient use, nitrogen fertilizers should be spread over the area where the herbicide treatment eliminated the weeds (weed-free zone) or along the cultivated tree-row strips where the majority of the active tree roots are located. Application to weeds or grasses will act to fertilize the weeds and the tree roots will get the leftovers. For this reason, broadcasting over the entire orchard floor is less efficient, requires considerably greater rates of application, and is more likely to benefit ground covers than the trees.

### Soil testing

Soil testing is an important diagnostic tool in evaluating nutrient imbalances and in understanding plant growth problems. Soil test results help growers adjust fertilizer application to provide nutrients that are lacking in the trees. Also, soil testing helps growers maintain soil pH within an optimum range (5.5-6.5 for chestnut), which keeps nutrients available for plant uptake. The soil test section is usually placed with the fertilizer section of a report like this, but we place it here to inform you that it should be used before you even plant your orchard. Common soil tests report includes soil pH, lime index, available phosphorus, potassium, calcium, and magnesium, liming and /or fertilizer recommendations based on the crop to be grown and soil test results. Michigan State University recommendations are given in “pound of nutrients needed,” not pounds of commercial fertilizer to be applied.

### Nitrogen recommendations, 0-5 years

Using this table, you can select the fertilizer of your choice based on availability and specific needs. Note the difference between actual nitrogen, ‘Amount of nitrogen per tree’ and product amount as indicated in the ‘Urea’, ‘Ammonium Nitrate’, and ‘Ammonium Sulfate’ columns. These recommendations are based on standard fruit and nut tree nutrient management from Europe. A given site may require more or less depending on soil and leaf analysis. Visual observation of leaf color can also be a useful indicator of tree health. Leaf yellowing may be an indicator that the soil pH is too high at those locations which prohibits the tree from efficiently utilizing the macro and micronutrients you have made available. Growers should be evaluating and adjusting pH via soil testing and visual observation.

<b>Annual nitrogen recommendations for chestnut trees from planting through year five.</b>						
<b>Field age</b>	<b>Amount of nitrogen per tree (oz.)</b>	<b>Urea, 48% N</b>	<b>Ammonium sulfate, 21% N</b>	<b>Triple 19, 19% N</b>	<b>Triple 16, 16% N</b>	<b>Triple 12 12% N</b>
0	None	0	0	0	0	0
1	2	5 oz	10 oz	11 oz	13 oz	1
2	4	8 oz	1 lb 3 oz	1 lb 5 oz	1 lb 10 oz	2
3	6	13 oz	1 lb 11 oz	2 lb	2 lb 6 oz	3
4	8	1 lb 2 oz	2 lb 5 oz	2 lb 13 oz	3 lb 3 oz	4
5	12	1 lb 10 oz	3 lb 6 oz	4 lb	4 lb 13 oz	6

## Nitrogen recommendations, older than 5 years

Fertilizer rates for bearing chestnut trees are determined by tree size and vigor. The diameter of the trunk is multiplied by the nitrogen rate based on the average length of last year's terminal branch growth. **Note: Regardless of the outcome of the nitrogen calculation above, no more than 1 lb. (16 oz.) of actual nitrogen should be applied per tree annually.**

- Low vigor: If tree growth is considered low (under 8 inches per year) then a multiplier rate of 1/6 lb. (2.7 oz.) nitrogen per inch of trunk diameter is used.
- Normal vigor: If tree growth is considered normal (8 to 12 inches per year) then a multiplier rate of 1/8 lb. (2 oz.) nitrogen per inch of trunk diameter is used.
- Excessive vigor: If growth is more vigorous (greater than 12 inches on average) then a multiplier rate of 1/10 lb. (1.6 oz.) nitrogen per inch of trunk diameter

### Annual nitrogen recommendations for bearing chestnut trees 6 years or older.

Trunk Diameter (in.)	Vigor	Last year's terminal growth (in)	Nitrogen (lb.)	Actual N per tree (lb.)*	Urea (46% N)	Ammonium sulfate (21% N)
3	Low	<8	0.17	0.5	1.1	2.4
3	Normal	8-12	0.13	0.4	0.8	1.8
3	High	>12	0.10	0.3	0.7	1.4
4	Low	<8	0.17	0.7	1.4	3.2
4	Normal	8-12	0.13	0.5	1.1	2.4
4	High	>12	0.10	0.4	0.9	1.9
5	Low	<8	0.17	0.8	1.8	4.0
5	Normal	8-12	0.13	0.6	1.4	3.0
5	High	>12	0.10	0.5	1.1	2.4
6	Low	<8	0.17	1.0	2.2	4.8
6	Normal	8-12	0.13	0.8	1.6	3.6
6	High	>12	0.10	0.6	1.3	2.9
7	Low	<8	0.17	1.0	2.2	4.8
7	Normal	8-12	0.13	0.9	1.9	4.2
7	High	>12	0.10	0.7	1.5	3.3
8	Low	<8	0.17	1.0	2.2	4.8
8	Normal	8-12	0.13	1.0	2.2	4.8
8	High	>12	0.10	0.8	1.7	3.8
9	Low	<8	0.17	1.0	2.2	4.8
9	Normal	8-12	0.13	1.0	2.2	4.8
9	High	>12	0.10	0.9	2.0	4.3
10 or greater	Low	<8	0.17	1.0	2.2	4.8
10 or greater	Normal	8-12	0.13	1.0	2.2	4.8
10 or greater	High	>12	0.10	1.0	2.2	4.8

\* Based on tree uptake, nitrogen applications should never exceed 1 lb actual nitrogen per tree annually.

## Insect management

Insecticides/miticides registered for use on edible chestnuts in Michigan, 2023										
Chemical Class (IRAC insecticide group)	Active Ingredient (IRAC insecticide group)	Products Labeled	Pesticide Efficacy <sup>1</sup>					Beneficial Insect Toxicity <sup>2</sup>		
			Potato leafhopper	Rose chafer	Japanese beetle	Two-spotted spider mite	European red mite	Bees	Mite predators	Insect predators
Pyridine azinomethine derivatives (9B)	Pyrifluquinazon	PQZ Insecticide	U	U	U	U	U	M	S	S
Multisite, Organophosphates (1B)	malathion	Fyfanon 57% EC, Malathion 5EC, Malathion 57EC, Malathion 8 Aquamal	N	F-G	F-G	U	U	T	M	M
	phosmet	Imidan 70-W	G-E	G	E	N	N	T	S	M
Avermectins (6)	emamectin benzoate**	Proclaim	N	N	N	F	U	T	S	S
Carbamates(1A)	carbaryl	Carbaryl 4L, Sevin XLR Plus, Sevin SL	E	G	G	U	U	T	T	T
Diamides (28)	chlorantraniliprole	Altacor	N	N	G	N	N	S	S	S
	cyantraniliprole	Exirel, Exirel Insect Control, Verdepryn 100SL Insecticide	G	N	G	N	N	M	S	S

1. Pesticide efficacy ratings; E-excellent, G-good, F-fair, P-poor, U-unknown, N-pest not included on label. 2. Beneficial insect toxicity; S-safe, M-moderate, T-toxic, U-unknown \* OMRI approved for organic production.\*\* Products containing these active ingredients are classified as a restricted use pesticides and require the applicator to retain a pesticide applicator license. Pesticide efficacy and beneficial insect toxicity is based on trials in fruit crops with products containing the same active ingredient, as reported in the E154 Fruit Management Guide, Michigan State University Extension.



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			Potato leafhopper	Rose chafer	Japanese beetle	Two-spotted spider mite	European red mite	Bees	Mite predators	Insect predators
<b>Pyrethroids (3)</b>	alpha-cypermethrin	Fastac EC, Fastac CS Insecticide						T	U	U
	bifenthrin**	Batallion 2EC, Bi-Dash 2E, Bifenture 10DF, Bifenture EC, Bifen 2AG Gold, Brigade WSB, Brigade 2EC, Bifenthrin 2EC Insecticide, Discipline 2EC, Fanfare EC, Fanfare ES, Fanfare 2EC, Hero EW, Lancer 2EC, Sniper Helios, Sniper, Sniper LFR	G	U	E	U	U	T	T	T
	beta-cyfluthrin**	Baythroid XL, Sultrus	E	G	G	U	U	T	T	T
	cyfluthrin**	Tombstone, Tombstone Helios	U	N	U	N	N	T	T	T
	gamma-cyhalothrin**	Declare, Proaxis	U	G	G	U	N	T	T	T
	lambdacyhalothrin**	Cavalry II, Crusdaer 1EC, Grizzly Z, Grizzly Too, Kendo, Kendo 22.8CS, Lambda T, Lambda-CY AG, Lambda-CY EC, Lambdastar, Lambdastar 1CS, LambdaStar Plus Insecticide, Lamcap II, L-C Insecticide, Nufarm Lambda-, Cyhalothrin 1EC, Paradigm VC, Province, Province II, Ravage, Serpent 1EC, Silencer VXN, Silencer, Warrior II with Zeon, Willowood Lambda 1EC	U	G	G	U	N	T	T	T
	pyrethrin	EverGreen EC60-6*, Pyganic EC1.4 II*, Pyganic EC5.0 II*, Pyganic Specialty, Tersus Insecticide	U	F	F	U	U	M	S	S
	deltamethrin**	Delta Gold	U	N	U	N	N	T	T	T
	zeta-cypermethrin	Mustang Insecticide, Mustang Maxx	G	G	G	U	U	T	T	T
	fenpropathrin**	Danitol 2.4EC Spray	G	U	G	U	G	T	T	T

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			Potato leafhopper	Rose chafer	Japanese beetle	Two-spotted spider mite	European red mite	Bees	Mite predators	Insect predators
Neonicotinoids (4)	imidacloprid (4A)	Admire Pro , Advise Four, Alias 4F, Imidashot DF Insecticide, Macho 2.0 FL, Macho 4.0, Malice 2F, Marathon 60 WP, Midash Forte Insecticide, Montana 2F, Montana 4F, Nuprid 2SC, Nuprid 4.6F Pro, Nuprid 4F Max, Provoke, Sherpa, Widow, Willowood Imidacloprid 4SC, Wrangler	G	G	G	N	N	T	S	M
	acetamiprid (4A)	Anarchy 30SG, Anarchy 70WP, ArVida 30SG, Assail 30SG, Assail 70WP, Azomar, Intruder Max 70WP, Tristar 8.5SL, Quasar 8.5SL	E	G	G	N	N	M	S	M
	clothianidin (4A)	Belay Insecticide	E	G	G	N	N	M	S	M
	flupyradifurone (4D)	Altus, Sivanto 200SL, Sivanto Prime	N	N	N	N	N	S	S	S
	sulfoxaflor (4C)	Closer SC, Transform WG	G	U	U	U	U	T	U	U
Spinosyns (5)	spinosad	Entrust*, Entrust SC*, GF-120 NF*, Seduce*, SpinTor 2SC*	N	N	N	U	N	M	S	M
	spinetoram	Delegate WG	N	G	N	N	N	M	S	M
Tetramic acid derivatives (23)	spirotetramat	Kontos, Movento	N	N	N	U	U	M	S	S
Flonicamid (9C)	flonicamid	Beleaf 50SG	N	N	N	N	N	M	S	M
Biopesticides	<i>Bacillus thuringiensis</i> (11A)	BT Now*, Dipel DF*, Leprotec*, Xentari*	N,U	N,U	N,U	N,U	N,U	S	S	S
	<i>Chromobacterium subtsugae</i>	Grandevo*, Grandevo CG*, Grandevo WDG*	U	N	N	U	U	S	S	S
	extract of <i>Chenopodium ambrosioides</i>	Requiem EC	U	N	N	U	U	U	S	S
	kaolin	Surround WP	F	F	F	N	N	S	M	M

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Chemical Class (IRAC insecticide group)	Active Ingredient (IRAC insecticide group)	Products Labeled	Pesticide Efficacy <sup>1</sup>					Beneficial Insect Toxicity <sup>2</sup>		
			Potato leafhopper	Rose chafer	Japanese beetle	Two-spotted spider mite	European red mite	Bees	Mite predators	Insect predators
Insect growth regulators	azadirachtin (IGR)	Aza-Direct*, Azaguard, Ecozin Plus 1.2% ME*, Molt-X, Neemix 4.5*	U	F	F	U	U	S	S	S
	buprofezin (16)	Centaur WDG	G	N	N	N	N	S	S	S
	diflubenzuron (15)	Dimilin 2L, Durant 2 L IGR, Unforgiven	N	N	N	N	N	T	T	T
	pyriproxyfen (7C)	Esteem 0.86EC, Esteem 35WP, Pitch 35WP, Terva 35WP	N	F,U	N	N	N	S	S	S
	methoxyfenozide (18)	Inspirato 2F, Intrepid 2F, Invertid 2F, Troubadour 2F Insecticide, Vexer, Zyllo Insecticide	N	N	N	N	N	S	S	S
	tebufenozide (18)	Confirm 2F	U	U	U	U	U	S	S	S
Premixed products	azadirachtin + pyrethrin (3)	Azera Insecticide	U	U	U	U	U	T	T	T
	chlorantraniliprole (28) + lambdacyhalothrin (3)**	Besiege Insecticide**	G	G	G	N	N	T	T	T
	abamectin (6)** + cyantraniloprole (28)	Minecto Pro**	U	U	U	E	E	T	S	S
	imidacloprid (4) + beta-cyfluthrin (3)**	Leverage 360**	E	G	G	U	U	T	S	M
	methoxyfenozide (18) + spinetoram (5)	Intrepid Edge	U	U	U	U	U	M	M	M
	bifenthrin (3)** + zeta-cypermethrin (3)**	Hero EW, Steed**	E	E	G	U	N	T	T	T
	zeta-cypermethrin (3)** + avermectin (6)**	Gladiator Insecticide/Miticide**	E	G	G	E	E	T	T	T
	lambdacyhalothrin (3)**; thiamethoxam (4A)	Endigo ZC**	E	E	G	E	N	T	T	T
	bifenthrin (3)** + imidacloprid (4A)	Avenger**, Brigadier Insecticide**, Skyraider**, Swagger**, Tempest**	E	E	G	U	U	T	T	T
lambdacyhalothrin (3)** + imidacloprid (4A)	Kilter**	U	U	U	U	N	T	T	T	

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## Insecticides/miticides registered for use on edible chestnuts in Michigan, 2023

Chemical Class (IRAC insecticide group)	Active Ingredient (IRAC insecticide group)	Products Labeled	Pesticide Efficacy <sup>1</sup>					Beneficial Insect Toxicity <sup>2</sup>		
			Potato leafhopper	Rose chafer	Japanese beetle	Two-spotted spider mite	European red mite	Bees	Mite predators	Insect predators
<b>Miticides</b>	acequinocyl (20)	Kanemite 15SC	N	N	N	G	G	S	S	S
	hexythiazox (10A)	Hexamite, Onager, Onager Optek, Savey 50DF	N	N	N	E	R	S	S	S
	fenazaquin (21)	Magister SC, Magus Miticide	U	U	U	E	E	T	M	S
	fenpyroximate (21A)	Portal XLO, Portal Miticide/Insecticide	G	N	N	G	E	M	M	M
	tolfenpyrad (21A)	Apta	U	U	U	U	U	M	S	S
	pyridaben (21)	Nexter Miticide/Insecticide, Nexter SC Miticide/Insecticide	N	N	N	G	E	M	M	M
	spirodiclofen (23)	Envidor 2SC	N	N	N	E	E	M	S	M
	cyflumetofen (25)	Nealta	N	N	N	E	E	S	S	S
	etoxazole (10)	Eschaton 5WDG, Zeal Miticide 1	N	N	N	E	E	S	S	S
	abamectin** (6)	Abacus Miticide/Insecticide, Averland FC, Abacus, Abacus V, Abacus V6, Abamex Miticide/Insecticide, Abba Ultra Miticide/Insecticide, Abba Ultra, Agri-Mek SC, Enterik 0.15LV, Reaper 0.15EC, Reaper Clearform, Reaper Advance, Willowood Abamectin 0.15EC, Willowood Abamectin 1.5LV	U	G	N	E	E	T	S	S
	bifenazate (20D)	Acramite 50 WS, Acramite 4SC, Banter WDG, Bizate 4SC, Bizate 50WDG, Enervate 4SC, Enervate 50WSB, Vigilant 4SC	N	N	N	E	G	M	S	S

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## Disease management

Fungicides labeled for use on edible chestnuts in Michigan, 2023		
Activity	Active Ingredient (FRAC fungicide group)	Products Labeled
Single site	fluopyram (7)	Luna Privilege
	propiconazole (3)	Bumper 41.8 EC, Fitness, Propi-Star EC, Propicure 3.6F, Propimax EC, Shar-Shield PPZ, Slant, Tilt, Topaz, Willowood Propicon 3.6 EC and more
	mefentrifluconazole (3)	Cevya Fungicide
	mefenoxam (4)	RidomilGold SL, ReCon 4F, Xyler FC
	flutriafol (3)	Topguard Fungicide
	trifloxystrobin (11)	Flint Extra, Gem 500 SC
	tebuconazole (3)	Buzz Ultra DF, Orius 3.6F, TebuStar 45 WP, Tebucon 45DF Fungicide, Toledo 45 WP, Willowood Teb 45 DF
	azoxystrobin (11)	Abound, Acadia 2SC, Aframe, Arius 250, Atticus Acadia 2SC, A-Zox 25SC, AzoxyStar, Azoxystrobin SC, Azoxyzone Fungicide, AZteroid FC 3.3, Azterknot, Dexter SC, Heritage Fungicide, Satori Fungicide, Tetraban, Trevo
Multisite	copper hydroxide + copper oxychloride (M01)	Badge SC, Badge X2
Premixes	sulfur (M2); tebuconazole (3)	GCS Tebustrobin SC, Helmstar Plus SC, Unicorn DF
	azoxystrobin (11) + difenoconazole (3)	Acadia ESQ Fungicide, Quadris Top
	azoxystrobin (11) + flutriafol (3)	Topguard EQ Fungicide
	azoxystrobin (11) + propiconazole (3)	Aframe Plus, Avaris 2XS, Cover XL, Propaz, Trevo P, Quilt Xcel
	boscalid (7) + pyraclostrobin (11)	Pristine
	fluaxpyroxad (7) + pyraclostrobin (11)	Merivon Xemium Fungicide
	cyprodinil (9) + difenoconazole (3)	Inspire Super, Vango ESQ
	fluopyram (7) + tebuconazole (3)	Luna Experience
	fluopyram (7) + trifloxystrobin (11)	Luna Sensation
Potassium based defense inducers	phosphorous acid, mono and dibasic sodium, potassium, and ammonium salts (33, P07)	Alude Fungicide, Fungi-Phite Fungicide, K-Phite 7LP Systemic Fungicide Bactericide, Phiticide, Phostrol
	potassium phosphite (P07)	Fosphite Fungicide, Rampart, Confine Extra
Biopesticides	neem oil (NC <sup>1</sup> )	Trilogy*
	<i>Streptomyces lydicus</i>	Actinovate AG
	<i>Trichoderma biopesticides</i> (NA <sup>2</sup> )	Bio-Tam 2.0*, RootShield WP Biological Fungicide, RootShield Granules*, RootShield Plus Granules*, RootShield Plus WP*
	Bacillus biopesticides (44)	Aviv*, Double Nickel 55*, Double Nickel LC*, Serifel Biofungicide*, Serenade ASO*, Serenade Max*, Sonota*, Serenade Opti
	<i>Reynoutria sachalinensis</i> extract (P5)	Regalia* Regalia CG*

1. Not classified as belonging to a particular mode of action. 2. Not listed or classified by the Fungicide Resistance Action Committee. \*OMRI approved for organic production.



# Weed management

## Herbicides registered for use on edible chestnuts in Michigan, 2023

Application timing <sup>1</sup>	Active ingredient (WSSA group number <sup>2</sup> )	Trade Name	Notes	Preharvest Interval <sup>3</sup>
Pre-emergent	flumioxazin (14)	Chateau EZ, Chateau SW, Flumi 51 WDG, Tuscany SC Herbicide, Tuscany, Varsity, Warfox, Zaltus SC	Controls most broadleaves and grasses. Fall application is most effective. Apply to trees established at least 1 year.	60 days
	indaziflam (29)	Alion Herbicide	Controls annual grasses and broadleaf weeds. Orchards must be at least one year old.	14 days
	rimsulfuron (2)	DuPont Matrix SG, Grapple, Hinge, Kasai, Matrix FNV, Pruvin Herbicide, Solida Herbicide, Tetris SG	Apply to trees established at least 1 year. Controls grasses and broadleaves.	14 days
	pendimethalin (3)	Prowl H2O, Pin-Dee 3.3 EC, Satellite Flex, Satellite HydroCap Herbicide, Stealth Herbicide	Non-bearing only. Controls annual grasses and some broadleaves.	Non bearing, see label
	oryzalin (3)	Surflan AS	Controls annual grasses and some broadleaves for 4-6 weeks. Apply in spring before weeds emerge. Needs rainfall	see label
	isoxaben (21)	Trellis or Trellis SC	Controls broadleaves for 4-6 weeks. Apply to established bearing and non-bearing trees.	60 days
Post-emergent	ammonium nonanoate	Axxe	OMRI approved. Broad spectrum, non selective burn down of broadleaf and grass weeds.	see label
	clethodim (1)	Arrow 2 EC, Avatar, Avatar S2, Ceridian 2EC Cleanse, Clethodim 2E, Dakota, Intensity Post- Emergence Grass Herbicide, Intensity One Post-Emergence Grass Herbicide, Section Three Herbicide, Select Max Herbicide with Inside Technology, Shadow Herbicide, Shadow 3EC, Tide USA Clethodim 2EC, Volunteer Herbicide, Willowood Clethodim 2EC	Selective, postemergence for annual and perennial grasses. Non bearing trees only. Shadow Herbicide requires a supplemental label.	Not applicable
	glyphosate (9)	Buccaneer, Buccaneer 5 Extra, Buccaneer Plus, Cornerstone Plus, Cornerstone 5 Plus, Credit 41 Extra, Credit 5.4 Extra, Duramax Herbicide, Durango DMA Herbicide, Envy, Envy Intense, Four Power Plus, Gly Star Original, Gly Start Plus, Glyphogan Plus Herbicide, Glyphosate 4 Plus, Honcho K6 Herbicide, Mad Dog, Makaze Herbicide, Roundup PowerMAX, Roundup WeatherMAX, and more	Controls annual and perennial weeds. Avoid contact with trees.	3 days
	oryzalin (3)	Fugitive, Surflan Flex	Surface applied to control many annual grasses and broadleaf weeds.	see label
	glufosinate-ammonium (10)	Cheetah Herbicide, Fever, Glufosinate 280SL, Inflamm 280 SL, Interline Herbicide, Scout Herbicide, Willowood Glufosinate 280SL	Controls broadleaf and grassy weeds. Avoid crop contact.	14 days
	paraquat (22)	Devour, Gramoxone SL 2.0, Gramoxone SL 3.0, Helmquat 3SL, Paraquat Concentrate, Para-Shot 3.0, Parazone 3SL, Quik-Quat, Purgatory 3 SL	Restricted use pesticide. Desiccates green foliage.	see label
	mesotrione (27)	Atticus Cavallo 4SC, Bellum, Broadworks, Meso Star, Mesotrione 4SC, MesoTryOne 4L, Motif Herbicide	Systemic herbicide for the control of broadleaf weeds. Only apply to vigorous orchards, one year or older.	30 days
	carfentrazone (14)	Aim EC, Longbow EC	Controls small broadleaf weeds. Include NIS in tank mix.	3 days
	pyraflufen (14)	Venue	Use with other post-emergent herbicides to improve broadleaf weed desiccation. Include non-ionic surfactant.	0 days
	pelagronic acid	Scythe Herbicide	Broadspectrum burndown for site prep and spot treatments, and as shielded application.	see label
	sethoxydim (1)	Poast	Kills grasses. Use high rate for perennial grasses. Use with non-ionic surfactant.	15 days
2, 4-D (4)	2,4-D Amine, De-Amine 4, Embed, Formula 40, Orchard Clean, Orchard Star, Rugged Herbicide, Saber, Savage Dry Soluble, Shredder Amine 4, Weed Rhap A-4d, WeeDestroy AM-40 Amine Salt, Weedar 64	Controls most annual and perennial broadleaf weeds. Note 60-day preharvest interval.	60 days	
Pre/Post Emergent	sulfentrazone (14)	Aquesta 4F, Maxunitech Sulfentrazone 4SC, Sulfentrazone 4L, Sulfin 4SC	Controls select grasses, sedges and broadleaf weeds. Trees must be healthy and 1 year or older. Avoid contact with tree.	3 days
	oxyfluorfen (14)	Collide Herbicide, Galigan 2E, GoalTender Herbicide, Goal 2XL, Oxystar 4L	Some grasses and broadleaf weed control. Apply while trees are dormant.	Dormant only
	halosulfuron (2)	Profine 75, Stadia	Controls nutsedge and broadleaf weeds. Apply to nut trees that have been established 1 year or more.	1 day

1. Pre-emergent herbicides should be applied to control weeds before germination takes place. Post-emergent herbicides may be applied to actively growing weeds.

2. WSSA (Weed Science Society of America) herbicide group numbers, based on the site of action.

3. The preharvest interval is the minimum number of days between application and harvest.