4 Common Organic Pesticides in Agriculture

The table below provides a comparative overview of pesticides commonly permitted (or referrenced) for U.S. organic agriculture. Use this table to determine which pesticide(s) is most appropriate for your situation.

ACTIVE INGREDIENT (A.I.)	TYPE*							BEE TOXICITY	
Acetic acid (vinegar)				H		A		MEDIUM	✘
Azadirachtin / neem oil	I	M						MEDIUM	✘
Bacillus amyloliquefaciens			F					LOW	
Bacillus subtilis			F					MEDIUM	✘
Bacillus thuringiensis ssp. *aizawai*	I							MEDIUM – HIGH	✘
Bacillus thuringiensis ssp. *kurstaki / israelensis*	I							LOW	
Beauveria bassiana	I							MEDIUM–HIGH[W]	✘
Bicarbonates (sodium / potassium)			F					LOW	
Boric acid	I							LOW	
Burkholderia spp. strain A396	I	M						LOW – MEDIUM	✘
Cedar oil	I	M			R			LOW – MEDIUM	✘
Chromobacterium subtsugae	I	M						LOW – MEDIUM	✘
Cinnemaldehyde	I	M	F					LOW	✘
Citrus oil (Limonene / D-limonene)	I			H				LOW	✘
Coppers			F					LOW – MEDIUM	✘
↳ Copper sulfate ($CuSO_4$)			F					LOW – MEDIUM	✘
↳ Copper sulfate + lime (Bordeaux mixture)			F					MEDIUM	✘
Corn gluten				H				LOW	
Cydia pomonella granulovirus	I							LOW	
Diatomaceous earth	I	M						MEDIUM	✘
Garlic, cottonseed, or clove oil	I	M	F		R			LOW – MEDIUM	✘
Gibberellic acid							P	LOW – MEDIUM	✘
Gliocladium catenulatum			F					LOW	✘
Horticultural oil / narrow range oil	I	M	F					MEDIUM	✘
Hydrogen dioxide, peroxyacetic acid			F					HIGH	✘
Insecticidal soap	I	M	F					LOW – MEDIUM	✘
Isaria fumosorosea	I	M						LOW – MEDIUM	✘
Kaolin clay	I	M						LOW	✘
Lime sulfur	I	M	F					LOW – MEDIUM	✘
Pyrethrins	I	M						HIGH	✘
Pythium oligandrum			F					LOW	✘
Reynoutria sachalinensis extract			F					LOW	
Rotenone	I	M						MEDIUM – HIGH	
Ryania/Ryanodine	I							LOW – MEDIUM	
Sabadilla (*Schoenocaulon officinale*)	I							LOW – MEDIUM	✘
Spinosad	I	M						HIGH	✘
Streptomyces spp.			F					LOW	
Sulfur	I	M	F					LOW	✘
Tea tree oil			F					LOW	
Trichoderma spp.			F					LOW	✘

NOTES

* **TYPE**—insecticide (**I**); miticide (**M**); fungicide (**F**); herbicide (**H**); repellent (**R**); adjuvant (**A**); plant growth regulator (**P**)

DO NOT APPLY directly to, or allow to drift onto, flowering plants

† **MOA**—Mode of action (e.g., how a pesticide works, or the mechanism by which it causes physiological disruption at its target site[s])

	NOTES & SPECIAL PRECAUTIONS
	Applications made with concentrations of acetic acid over 10% likely to be toxic to bees and other beneficials
	Mixing with soap increases toxicity to bees
	Slow-acting MOA†—Impacts on bees likely to be delayed
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	Toxic to butterflies and other beneficials (Diptera)
	Slow-acting MOA†—Impacts on bees likely to be delayed; ⚠ (see Coppers below); W—wet formulation
	Uses for structural pest control are unlikely to affect bees; use caution if applying fertilizers that contain boric acid
	MOA† suggests that impacts could be delayed, but no data currently available
	Repellent to bees and may disrupt pollination
	Slow-acting MOA†—Impacts on bees likely to be delayed; repellent to bees and may disrupt pollination for up to a week
	Toxic to other beneficials (ground beetles, mites, nematodes)
	Repellent to bees and may disrupt pollination
	Avoid heavy repeated use—copper can accumulate in soils and contaminated soils are difficult to remediate ⚠ **Do not apply copper(s) within one week of *Beauveria* application**
	Slow-acting MOA†—Impacts on bees likely to be delayed
	MOA† suggests that impacts could be delayed, but no data currently available
	Only toxic to bees upon direct contact; if applying during bloom, apply at night to minimize risk to bees
	Slow-acting MOA†—Impacts on bees likely to be delayed
	Can disrupt foraging bees at time of application; if applying during bloom, apply at night
	Repellent to bees and may disrupt pollination
	MOA† suggests that impacts could be delayed, but no data currently available
	Highly toxic to honey bee larvae. PROHIBITED FOR USE IN U.S. ORGANIC AGRICULTURE.
	Slow-acting MOA†—Impacts on bees likely to be delayed. CANCELLED.
	Granular spinosad bait products generally have a much lower exposure risk for bees
	Only registered for greenhouses / ornamentals
	Repellent to bees and may disrupt pollination; may reduce pollen viability for some crops
	Slow-acting MOA†—Impacts on bees likely to be delayed