THE NEMATICIDAL AND HERBICIDAL ACTIVITIES OF FURFURAL: A REVIEW

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Furfural [2-furfuraldehyde] is a naturally occurring compound, present in some essential oils and in foods such as bread, baked products, and coffee. It is prepared industrially by treatment with hot sulfuric acid of pentosans contained in agricultural residues, such as cereal straws, brans, and sugarcane bagasse. The acid hydrolyzes the pentosans and dehydrates the freed pentoses. Furfural is a colorless oily liquid that turns yellow to brown on exposure to air and light. It is soluble in 11 parts of water and has a density of 1.1563 and a boiling point of 161.8 C. Fungicidal properties of the compound have been known since the 1920's and it has been used for control of seed and seedling diseases, as a wood preservative, and for suppression of various plant pathogenic fungi.

Although furfural can be injected into soil, field and microplot studies have demonstrated that delivery by drenching results in the greatest pesticidal activity. Recent work has shown that furfural can be nematicidal when delivered in drench applications at rates 400 - 600 kg ai/ha. At these rates furfural controlled the reniform nematode [*Rotylenchulus reniformis*] and root-knot nematodes [*Meloidogyne* spp.]. Drench applications of furfural are ineffective for controlling nutsedges [*Cyperus* spp.] but have limited herbicidal activity against some broadleaf weeds [morningglory, sicklepod] and grass species at rates > 600 kg ai/ha.

Furfural is an excellent solvent and can be combined with other registered compounds to enhance pesticidal activities. Combination treatments with metam sodium or with propionic acid have been shown synergistic for herbicidal and nematicidal activities. Emulsifiable concentrates of dazomet in furfural have shown excellent and consistent broad-spectrum pesticidal activities when applied to soil. It is with these types of combination treatments that furfural has good potential for replacement of methyl bromide in soil fumigation.