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4-AMINO-3,5,6-TRICHLOROPICOLINIC ACID

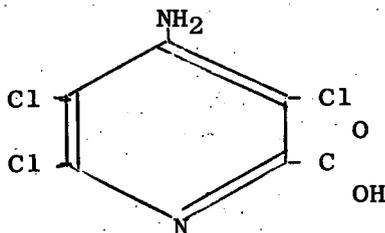
A NEW SYSTEMIC HERBICIDE

The Dow Chemical Company has recently discovered a new herbicide, 4-amino-3,5,6-trichloropicolinic acid, which is proving very active on many troublesome brush and weed species throughout the world. Although highly toxic to most broad-leaf weeds, most grasses are tolerant to this new herbicide.

1. Herbicidal activity - Initial response of broad-leaf plants is one of leaf curling and epinasty of tender growth. A distinctive upward or downward cupping of the leaves may also occur. Reaction on the meristematic tissue is very pronounced. 4-amino-3,5,6-trichloropicolinic acid is readily absorbed by leaves and translocated through the plant, but leaf kill is not as rapid as that observed from applications of 2,4-D and 2,4,5-T. As a result of excellent translocation, complete root kill of susceptible species is obtained. Resprouting from the roots of many root-sprouting brush species is eliminated. In addition, such deep-rooted perennial weeds as *Cirsium arvense* L. and *Convolvulus arvensis* L. are controlled with one application.

This new herbicide is readily absorbed by the roots of plants, and unwanted broad-leaf weeds and brush are controlled with soil applications at relatively low rates. 4-amino-3,5,6-trichloropicolinic acid is also extremely active when used in cut-surface treatments.

2. Chemical properties - 4-amino-3,5,6-trichloropicolinic acid



Molecular formula: $C_6H_3Cl_3N_2O$

Molecular weight: 241.5

Decomposes at: 215-230°C

In its purified physical state, 4-amino-3,5,6-trichloropicolinic acid is a white powder with a slight, chlorine-like odor. At 25°C, solubility is 430 p.p.m. in water; 5,500 p.p.m. in isopropyl alcohol; and 20,000 p.p.m. in acetone. Oil solubility is low; for example, only 10 p.p.m. in kerosene.

3. Toxicity - To date, acute and chronic toxicity tests have shown 4-amino-3,5,6-trichloropicolinic acid to be low in mammalian toxicity. Acute oral LD₅₀ values for rabbits, mice, guinea pigs, chicks, and rats range from 2.0 g/kg for rabbits to 8.2 g/kg of body weight for rats. In comparison the LD₅₀ values for 2,4-D and 2,4,5-T range from 0.375 g/kg for mice to 1.0 g/kg of body weight for guinea pigs. Skin absorption is very low and we anticipate no hazard from handling and normal use of this herbicide. Ninety-day dietary feeding tests conducted on rats indicate that 4-amino-3,5,6-trichloropicolinic acid is low in chronic toxicity. A level of 1,000 p.p.m. of 4-amino-3,5,6-trichloropicolinic acid (0.1%) in the diet caused no observable adverse effects as judged by the usual clinical and pathological tests.

The effect of chemicals on wildlife is a matter of serious concern and it is encouraging that a chemical, which has such high biological activity, presents little or no hazard to fish, game animals, and pets.

4. Soil persistence - 4-amino-3,5,6-trichloropicolinic acid retains its herbicidal activity in soils longer than 2,4-D and 2,4,5-T. In greenhouse pot tests, high rates are very persistent. Rates used for control of perennial weeds, 2-3 lb per acre, have persisted into the year following treatment and highly sensitive plants are injured. However, grasses and grass crops can generally be grown the year following treatment. Where low rates have been used for selective weed control in crops 1/4 to 2 oz/acre, highly sensitive plants have been grown the following year. The rate of loss of this herbicide from the soil occurs most rapidly at low concentrations. Extensive field and laboratory experiments are being conducted throughout the world to determine more fully the fate of 4-amino-3,5,6-trichloropicolinic acid in soils.

5. Selective use - The use of 4-amino-3,5,6-trichloropicolinic acid for selective weed control in certain crops appears promising. In many areas of the world, numerous weeds resistant to presently used herbicides have proven highly susceptible to this new herbicide. Various *Polygonum* spp., which are becoming more of a problem in grains through continual use of 2,4-D and MCPA, are controlled by low rates of 4-amino-3,5,6-trichloropicolinic acid. In Europe, less than 1/2 ounce per acre is giving control of May weeds, *Matricaria* spp. In South Africa, *Amsinckia* and *Emex* spp. are being controlled in grain.

Experiments thus far indicate that combination of this new herbicide with various phenoxy herbicides can result in a

very broad range of weed control in grass crops such as the small grain, corn, sorghum, and sugar cane. In addition, Brassica crops are showing tolerance, and selective use of 4-amino-3,5,6-trichloropicolinic acid in these crops appears promising.

6. Brush control - To date, more than 185 species of woody plants have been found to be moderately or highly susceptible to foliage applications at rates of less than 1 lb of 4-amino-3,5,6-trichloropicolinic acid per 100 gallons of water.

Excellent kill of roots as well as above-ground parts is being obtained. In addition, many species resistant to the phenoxy herbicides are highly susceptible to this new herbicide.

Work conducted thus far would indicate that this new herbicide is very active on many problem weeds, and further research is encouraged to determine its usefulness on specific weed problems in different areas.

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PICLORAM (4-AMINO-3,5,6-TRICHLOROPICOLINIC ACID) TRIALS IN SOUTH AUSTRALIA

A series of 11 trials is being conducted throughout South Australia to determine the usefulness of picloram in the agricultural pattern.

Results assessed to date (December 1964) indicate that picloram gives better control of many deep-rooted perennial weeds and woody species at lower rates than other herbicides commercially available. Generally, maximum rates necessary have been less than 2 lb acid equivalent per acre.

1. Skeleton weed (Chondrilla juncea L.) - At three sites throughout the Murray Mallee, picloram is now being assessed to determine its ability to eradicate skeleton weed from small patches.

At Karoonda (sandy mallee soil type, rainfall 14 inches), December (1963)-sprayed plots (1/1000 acre) in randomized block design have been assessed after 12 months.

No regrowth has occurred on any picloram-sprayed plots. Application rates range from 1.5-23.5 lb acid equivalent per acre.

By comparison, some regrowth has occurred on 8 of the 12 plots treated with 2 and 4 lb acid equivalent 2,3,6-TBA (2,3,6-trichlorobenzoic acid) and dicamba (2-methoxy-3,6-