

**PERSISTENCE OF SIMAZINE AND ITS EFFECTS ON
THE COMMON WEEDS GROWN IN CORN FIELD**

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I. I N T R O D U C T I O N

The menace of weeds is as old as man himself, challenging the very existence of crops by competing with them for light, moisture and nutrients. They lower crops quality, harbor insects and diseases and increase labor and equipment costs. Some weeds are poisonous and are direct causes for livestock losses.

Maize (Zea mays L.) is one of the major feed and food crops in Egypt. Cultivation is the most widespread method of weed control which has so far been practised in maize.

The use of simazine as a herbicide in maize production has shown promise; but it is of low solubility that causes long persistence of simazine in the soil. The length of time that a herbicide persists in the soil is extremely important as it relates to the length of time that weed control can be expected. Also, residual toxicity is important because of possible injury to succeeding sensitive following crops, this is particularly important in Egypt where two or three crops are grown successfully in one year.

Irrigation may account for the removal of simazine from the upper layers to lower layers of the soil and this results in turn in avoiding damage to the succeeding crops.

The aim of this study is to investigate the persistence of simazine in soil and its effects on maize and associated weeds under different irrigation frequencies and to observe simazine residual toxicity on the following crops.

II. REVIEW OF LITERATURE

Effect of Simazine on Weeds :

Some weeds are sensitive to simazine, whereas some others are resistant. Barnyard grass, bristly foxtail, bladder ketime, salt bush, amaranth, and wild oats (74). Viola tricolor, Echinochloa crus-galli and Scleranthus annuus(127) are sensitive to simazine. Convolvulus arvensis, Agropyron repens (77), european glorybird, dull seed corn bind, bitter winter cress, and european blackberry (74) are resistant to simazine. On the other hand, some perennials such as corn-bind, thistle field, horsetail, coco-grass and dandaleon are easily killed by simazine (3).

Simazine applied to corn before sowing destroyed salt buch, euphorbia, amaranth and bristly foxtail grass well but had only weak action on glorybind (135).

There is an increase in the deleterious effect of simazine with increase in the level of its application. Applying simazine at a rate of 1 lb. per acre gave 99% control of broad leaved weeds and 86% control of grasses such as foxtail (Setaria spp.), witch grass (Panicum capillare) and crab-grass (Digitaria sp.), (9), 1 lb. (a.i) per acre resulted in complete control of annual weeds (92), 2 lb. (a.i) per

acre as surface application killed Chenopodium album, Amaranthus retroflexus, Portulaca oleracea and Taraxacum spp. (39); 2-4 lb. per acre caused complete control of annual weeds during the growing season (137); 2 lb. per acre gave 100% control of broad leaved weeds and 96% control of grasses (9); 4 lb. per acre as pre-emergence kept plots essentially free from both grasses and broad leaved weeds during the growing season (76); 1.5-5 kg./ha decreased weeds by 5-20% (3); 2 kg./ha gave 72-90% control of annual weeds (131); and 80% control of weeds (119); 2 kg./ha before the emergence of corn shoots brought about an 58% decrease in the weight of weeds (17); 97.9-98.5% control of weeds (47); 2 kg (a.i) per acre killed 80-90% (119) and 52-67% of the weeds (74); 0.25-0.5 kg. as pre-emergence gave 84-97% control of Tripleuro spermum maritimum, Stellaria media and Apera spicaventi, also controlled Raphanus raphanistrum and Centaurea cyanus (73); 3 kg./ha destroyed 41.9-52.2% (5) and 90% (69) of weeds; 1-2 kg./ha reduced the number of perennial weeds by 36-51% and annual weeds by 78% (67); 5 kg./ha decreased the number of weeds in corn by 52.6-84% but failed to destroy all the european glorybind weed and horsetail (33).

Some weeds such as Agropyron repens and some broad-leaved weeds were not controlled by the lower rates of simazine (9). Foxtail was controlled by 2-4 lb. per acre of simazine if applied as sprays or granules to wet soil (122). Simazine

kills susceptible young seedling which usually emerge, but turn yellow or brown and soon die (70).

Applying simazine at a rate of 1 lb./acre caused severe stunting of top and root growth of Agropyron repens and other perennial weeds (92). On the other hand, at a rate of 0.5 kg./ha stimulated the growth of Rumex acetosella while the 1.5 kg./ha rate caused a degree of inhibition, also 3 kg/ha caused a degree of inhibition of the growth of Taraxacum officinale (127).

The extent of weed infestation is greatly regulated by simazine. Vasilev (136) found that the use of simazine at 2-6 kg./ha. decreased the extent of weed infestation of corn field by a factor of 8-10 times.

Simazine is superior to propazine and chlorazine with regard to the control of broad leaved weeds and grasses (9).

Simazine effect is influenced by the moisture content of the soil. The respective percentage control of dicotyledonous weeds and grasses on moist compost soil obtained with simazine at 0.5 g. per m² were 100 and 91.5%, while it was 10.9 and 3.5% in excess of that obtained where soil was dry (64).

The killed weeds give place to others weeds to grown. Monstvilaite (84) showed that simazine at a rate of 1 kg./ha. used in corn reduced weed numbers and dicotyledonous had given

place to perennial weeds and especially annual grasses.

Chenopodium album was replaced by Setaria spp. and Echinochloa crus-galli as the dominant weed species.

Pre-emergence application of simazine at 2.5 kg./ha one day after sowing was the most effective treatment for control of broad-leaved weeds in maize (107).

Simazine at 12-15 kg./ha applied to Rumex acetosella, Filago arvensis, Achillea millefolium, Equisetum arvense and Setaria glauca, decreased the sugar content especially sucrose in all weeds one month after application except E. arvense (96). This is because the herbicide failed to reach its deep rhizomes.

All annual weeds might be effectively controlled within 4 to 6 weeks with simazine applied at 1.5 kg in 900 L. water/ha. (51).

Effect of Simazine on Maize Growth F

Simazine had no harmful effect on maize plants even in high doses (80). Maize plants were not injured by simazine application up to 16 lb./acre (9).

Klingman (70), showed that corn has enzyme (s) which breakdown the simazine molecule, detoxifying the herbicide. Apparently the susceptible species do not decompose the simazine, or do it so slowly that the plant is killed. In addition , according to Mashtakov and Prokhorchik (81) simazine

stimulated the growth of the primary roots of plant hypocotyls and in some cases increased germinating power.

Maize plants grown in simazine treated soil were larger and greater than plants treated with other herbicides (chlorazine, propazine, G27901 and G30031) (9). Simazine applied at 3 kg./ha without normal cultivation on chernozem soil stimulated crop growth (14).

Many investigators are of the opinion that simazine increase the yield of maize plants (3, 9, 14, 17, 22, 35, 41, 47, 69, 74, 76, 107, 117, 120, 132, 136, 139). Applying simazine increased the yield of grains by 2-3 metric ctnr/ha. (2 kg./ha) (41), 7.1 metric ctnr/ha (2 kg./ha)(17), 9.8 metric centers/ha (2-3 kg /ha)(22), 30% (1.5 kg./ha) (139), 10-27% (2 kg./ha)(74) and 50% (2 kg./ha)(132).

The yield of maize silage increased by 42.4-70.4% by adding simazine at a rate of 3 kg./ha (5), whereas the yield of green mass increased by 75-170% by adding 2-8 kg/ha of simazine or atrazine (117), and by 2-2.8 times by adding 2-6 kg./ha of simazine or atrazine (136).

On the contrary, Fink (40), reported that yields of maize grain generally were unaffected by simazine treatments, except when simazine were applied at 10 lb./acre.

The increase of maize yield by adding simazine is mainly attributed to the weed control as Staniforth (123)

who reported a reduction of 7.4 bushels of corn per acre from weed competition. Uncontrolled weed/crop competition in two trials in maize fields reduced grain yield by 31.8 and 49.7% (52).

Applying simazine to maize field reduced the number of required hoeings (79, 117). Under average conditions, the net cost of herbicides treatment would be less than the value of corn lost through failure to control weeds (123).

Simazine at a rate of 10 kg./ha reduced the labour requirement for maize 3 to 6 folds of simazine applied at 3 kg./ha (79).

Effect of Simazine on Chemical Contents of Maize :

Simazine exerts a marked influence on the chemical contents of maize plants. Treated maize plants contained a higher % of protein- and non protein-N than did untreated plants; % nitrate was also increased, but free ammonia content appeared to be unaffected (48), on the contrary the non protein N % was unaffected while the % of free ammonia N was either unaffected or decreased in maize by atrazine at 1 lb./acre(37). Several workers reported that simazine caused an increase in the percentage of total nitrogen (37, 40, 48, 94, 37, 99, 100, 101, 106), total amount of nitrogen (100, 106), and percentage and total amount of phosphorus (94) and decreased the sugar content (106). The percentage of total nitrogen was