

GUAYULE (*PARTHENIUM ARGENTATUM* A. GRAY) SEEDLING TOLERANCE TO TOPICALLY APPLIED CARFENTRAZINE-ETHYL HERBICIDE

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Guayule is a desert adapted plant from the Chihuahuan Desert in North America that produces natural rubber. Weed control in direct-seeded plantings is a significant barrier to commercial rubber production from guayule. Preliminary post-emergence herbicide screening studies in transplanted guayule found that guayule had some tolerance to carfentrazone-ethyl (Aim™ herbicide from FMC®) and other protoporphyrinogen oxidase inhibitors. Studies were initiated in direct-seeded guayule to further characterize guayule seedling tolerance to carfentrazone at multiple locations in southern Arizona using randomized complete block designs with 4 to 6 replications. Carfentrazone was applied broadcast over-the-top of guayule plants at 4 target growth stages: 2, 4, 6 f and 8 to 10 leaf plants. The actual number of leaves per plant were counted at the time of spraying. The post-emergence herbicide treatments were applied using a tractor-mounted boom sprayer equipped with TeeJet® TT-11002 nozzles operated at 279 kPa that delivered a spray volume of 180L/ha at 5 km/hr. The carfentrazone rate ranged investigated included 8.7, 17.5, 26.2, 35.1, 52.7, and 70.1 g/ha; some studies only included the 17.5, 35.1, 52.7 and 70.1 g/ha rates. All carfentrazone herbicide treatments included a non-ionic surfactant at 0.5% v/v. Tolerance was evaluated by comparing pre-spray stand counts with counts collected at various days after treatment (DAT). Additionally, plant height was directly measured and canopy ground cover was estimated from nadir photographs and pixel analysis of the resulting images. Carfentrazone injury symptoms were manifest as necrotic spots on guayule leaves and in the loss of leaves from seedlings. The degree of injury increased as the rate of carfentrazone increased but injury decreased with increasing plant size. The untreated controls showed that some stand loss is normal during establishment. Carfentrazone rates up to and including 35 g/ha did not substantially increase stand loss even at the 2 true leaf and 3.6 true leaf growth stages. At carfentrazone rates of 53 and 70 g/ha there was a slight increase in stand loss but commercially acceptable stands were still obtained (as judged from the lack of skips in the seed-line greater than 0.5 m). Carfentrazone injury resulted in a reduction of leaf area immediately after spraying. The 2 true-leaf guayule canopy ground cover (cm²/m-row) 14 DAT with 17, 35, 53 and 70 g/ha was reduced 45, 78, 83 and 72%, respectively, compared to the untreated control. Similarly, 3.6 true-leaf guayule canopy ground cover at 7 DAT with 17, 35, 53 and 70 g/ha was reduced 65, 82, 86 and 89%, respectively, compared to the untreated control. The guayule seedlings grew out of this injury. The heights of seedlings treated with 35 g/ha carfentrazone at the 2, 3.6, 5.6 and 10.4 true-leaf growth stages were only reduced by 13, 20, 15, and 15 percent at 55, 48, 41 and 29 DAT, respectively. Similarly, the heights seedlings treated with 70 g/ha carfentrazone at the 2, 3.6, 5.6 and 10.4 true-leaf growth stages were reduced by 21, 29, 20, and 12 percent at 55, 48, 41 and 29 DAT, respectively. These data indicate that Aim at rates of 17 to 35 g/ha can be used for broadleaf weed control in guayule provided growers are educated to expect some injury immediately after application.

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