

ABSTRACT

The efficacy of the post-emergence graminicides, fluazifop butyl and sethoxydim and the selective broad-leaf herbicide, ioxynil, were evaluated in field trials with onion crops. Assessments were made, using various measurements, of amounts of all species present over time and their response to the herbicides. Comparisons were made with the standard pre-emergence herbicide, DCPA. A pre-emergence application of glyphosate was tested and used successfully against Cyperus rotundus in the first trial with no deleterious effect on onions. A range of rates of the graminicides was also tested against Cynodon dactylon as a weed in onions, planted in wooden boxes, and against Cynodon dactylon alone, in pots in the greenhouse. Apart from visual assessments, final fresh and dry weights of onions and weed were measured.

Fluazifop butyl plus 0.1 % non-ionic adjuvant gave good control of grasses present, mainly, Cenchrus echinatus, Digitaria ciliaris and Eleusine indica. Sethoxydim plus Shell White Oil and/or oil concentrate also killed most grasses but was slightly less effective than fluazifop butyl at the same rate. Regrowth of grass occurred at the lower herbicide rates, but corresponding yields of onions were not significantly different from those of the higher rates.

Broad-leaf weeds were classified according to their response to ioxynil. Species tolerant to ioxynil such as Oldenlandia corymbosa dominated the post-treatment weed flora. Generally, onion yields with herbicide treatments were much lower than those of the handweeded control; and virtually no marketable bulbs were produced in the unweeded control. Treatments in the final trial included "follow up" handweeding operations. The treatment combination of DCPA plus handweeding controlled weeds, had a similar onion yield to that in the completely handweeded treatment (consisting of three handweeding operations).

Metabolites were extracted from leaves treated with fluazifop butyl, by separating four fractions: hexane (fluazifop butyl ester); benzene (free fluazifop acid); diethyl ether (amino acid conjugate) and aqueous butanol (glycosidic conjugate). Consistently greater amounts per unit fresh weight were found in C.dactylon than in onion leaves.

Treatment with fluazifop butyl at six and eight times the normal rate killed young onion plants as well as C.dactylon. However, similar or higher rates of fluazifop butyl had little effect on older onions.

Experiments to determine spray retention using methyl red and, by direct weighing, indicated that

C.dactylon leaves retained more spray than onion leaves per unit fresh weight.

Scanning electron microscopy contrasted the smooth leaf surface of onions with the parallel arrangement of rows of papillae and prickles on the leaf surface of C.dactylon, thus giving a possible reason for the differences in spray retention between onion leaves and grass leaves.