Controlling Purple Nutsedge in Fallow Soil With EPTC and Butylate

E. S. Heathman, J. P. Chernicky, B. Barstow, C. Farr, B. Tickes, and D. R. Howell

Purple nutsedge (Cyperus rotundus) and yellow nutsedge (Cyperus esculentus) have become the predominate weed species in many summer crops and are practically uncontrollable with present technology. Both spread by tubers and basal bulbs formed from underground rhizomes. Purple nutsedge will produce most of its tubers (95% or more) in the top foot of soil; however, it may also produce tubers 2 or more feet below the soil surface. In contrast, yellow nutsedge rhizomes tends to concentrate tubers in the top 6 inches of soil, with few, if any, below 1 foot. The basal bulbs produce the aboveground growth or shoots which provide the necessary photosynthate for the development of new tubers and basal bulbs. Most tuber production in both sedges occurs in July through September. Mature tubers can lay dormant in soil for several years.

Purple nutsedge tubers on the soil surface are subject to dessication. But, as stated earlier, numerous tubers are deeper in the soil profile; therefore, exposure to drought is only partially successful. Despite being close to the soil surface, yellow nutsedge tubers are reported (in California) as less susceptible to desiccation and summer fallow conditions and not reduced significantly by fallow treatment.

When the nutsedge tuber population in the soil increases to a high enough level to seriously effect stand establishment and/or crop yields, the land may become unsuitable for summer crop production. Herbicides such as EPTC and butylate give only partial control of yellow or purple nutsedge when applied to irrigated crops as labelled. Field research was conducted at Casa Grande, Goodyear and Roll, Arizona on fallowed ground, from 1985 to date, to measure the response of purple nutsedge to EPTC (Eptam, Genep) and butylate (Sutan +, Genate +), both thiocarbamate herbicides. Weed control studies have also begun on yellow nutsedge.

EPTC and butylate remain in the soil for a relatively short time (1 to 3 weeks in warm moist soils that are typical of soil conditions during crop production). However, they may persist much longer under fallow conditions. The relatively short duration of control achieved with thiocarbamates in cropping systems is probably the result of having optimum conditions for the rapid growth of nutsedge. In addition, these herbicides have a short residual life under irrigated conditions.

Fallow conditions improve nutsedge control by increasing the soil persistence, as well as by reducing the vigor of the weeds. Summer fallow, plus disking in thiocarbamate herbicides, has successfully reduced purple nutsedge tuber populations 80% or more in the top 8 to 10 inches of treated soil. Nutsedge tubers below 10 inches have not been directly effected by these treatments. Summer fallow treatments with EPTC or butylate offer the opportunity for a temporary reduction in nutsedge tuber populations. Only EPTC is proposed for labeling for fallow treatment.

Factors Relating To The Successful Control Of Purple Nutsedge With Thiocarbamates Herbicides

1. The solubility of EPTC and butylate in water are 370 ppm and 45 ppm respectively. EPTC would be particularly susceptible to movement in the soil. It can be moved below the top 10 inches of soil or diluted with irrigation.
2. Irrigation has affected the preformance of both EPTC and butylate. In four trials, superior control of purple nutsedge has been achieved where the herbicide has been applied and disked in 1 or 2 weeks following an irrigation, rather than being applied and disked in immediately before an irrigation. EPTC had performed much less effectively when applied immediately before an irrigation.
3. With irrigation or rainfall, the persistence of EPTC in the soil is shorter than that of butylate. Under crop growing conditions, the-half life of butylate is reported to be 3 weeks while the half-life of EPTC is 1 week. Where moisture in the soil is limited, as in Arizona fallow conditions, the persistence of these herbicides has not been established. It

has been our experience that they will persist for several months in dry soils. Without an irrigation 30 to 60 days prior to planting a susceptible crop, the crop can be injured from herbicide carry-over.

4. Purple nutsedge will continue to make at least some top growth throughout the summer without any irrigation, mostly from tubers below 10 inches in depth. Yellow nutsedge tubers has not produced aboveground growth under the same dry conditions.

5. In three trials, butylate has given the most consistent control of purple nutsedge when the herbicides were applied during summer fallow, without irrigation within 60 days either before or after application. Control of tubers in the top 10 inches of soil has been 90% or more at all locations. EPTC has been less consistent under these non-irrigated conditions, particularly in controlling new growth from tubers below 10 inches, after an irrigation was applied. This lack of control by EPTC of growth from the deeper tubers maybe caused by leaching and dilution of the herbicide by the irrigation and/or the rapid breakdown of EPTC in moist soil (half life 1 week).

6. The rate of herbicide tested has been either 3.3 or 6.7 lb/A for each material. There has been little or no advantage in using the higher rate over the 3.3 lb/A. Weed control was not improved over a single application when 2 applications were made during a season, 60 days apart and when an irrigation was applied for each treatment either before or after application.

7. EPTC or butylate applied to fallow soil affect purple nutsedge tubers in the top 10 inches of soil. They can reduce tuber population in this area by 80% or more; this is the same portion of the soil profile where most of the purple nutsedge tubers occur. However, it should be understood that tubers not controlled either in the treated area or those deeper in the soil will eventually produce new aboveground vegetative growth and eventually create new tubers.

Therefore, fallow ground treatments should only be considered as a tool for reducing purple nutsedge tuber populations to a level that a normal stand of the next summer crop can be achieved. The grower must be prepared to have a vigorous followup program in subsequent crops to insure against a rapid buildup of nutsedge infestations to the original or higher levels.