416/1522 2017

# Yellow nutsedge (*Cyperus esculentus*) control in peanut

Timothy L. Grey

Weeds persist and cause economic losses in agricultural systems because they exploit an underutilized portion of that system. Reducing the impacts of weeds on agroecosystems begins with minimizing the number of propagules (e.g, seeds and tubers) that are produced and returned to the soil. Yellow nutsedge is a problematic weed around the globe, persisting between growing seasons as tubers in the soil. Diclosulam is an effective means of controlling many peanut weed species and has activity toward yellow nutsedge. Studies were conducted in 2016 and 2017 to evaluate the effect of various rates of diclosulam on yellow nutsedge tuber production. Single pre-sprouted purple nutsedge tubers were transplanted into outdoor microplots and treated after six weeks of growth with six rates of diclosulam (1.7 to 53 g ai $ha^{-1}$) POST and a nontreated control. All shoots emerged at the time of application were marked with plastic rings; this allowed for classification of tubers at exhumation of 1) tubers attached to shoots that were emerged at time of application, 2) tubers attached to shoots that emerged after application, and 3) tubers without an aerial shoot during the study. Seven weeks after application, the tubers in the microplots were exhumed, tubers classified, quantified, and ability to sprout evaluated (Figure 1). In the nontreated control, there were 530 total tubers, with a log-logistic regression model describing the tuber population with increasing diclosulam dose (Table 1). Diclosulam reduced total tuber population from 0 to 50% as compared to the nontreated controls with an $LD_{50}$ of 0.2257 g ai $ha^{-1}$ (Figure 2). There were no differences among treatments in number of tubers attached to emerged aerial shoots at the time of application. However, the viability of these tubers was reduced by diclosulam. In the nontreated control, there were hundreds of tubers that were attached to shoots that emerged following diclosulam application, while the 53 g $ha^{-1}$

diclosulam dose reduced tuber numbers. However, new shoot emergence may give the initial visual impression to the grower that the treatment was ineffective as shoot emergence continued following treatment. Viability of these tubers was reduced by diclosulam, suggesting the action of the herbicide may have rendered the tuber nonviable after new shoots were produced. The final classification of tubers was those that did not have an aerial shoot during the study. These were tubers in which apical dominance suppressed shoot development or were likely the most recent tubers to develop. Of the three classes, the tubers without shoots were the most numerous in the nontreated control, with hundreds of tubers. At the 53 g $ha^{-1}$ diclosulam, tuber production was effectively reduced relative to the nontreated control. Diclosulam is an effective herbicide that controls yellow nutsedge foliage, but also reduces the number of new tubers produced and overall tuber viability. This could be an important component used to reduce the long-term population density of this weed.

Figure 1. Yellow nutsedge in field set for excavation 7 weeks after treatment with diclosulam. Tubers processed for germination testing after field excavation

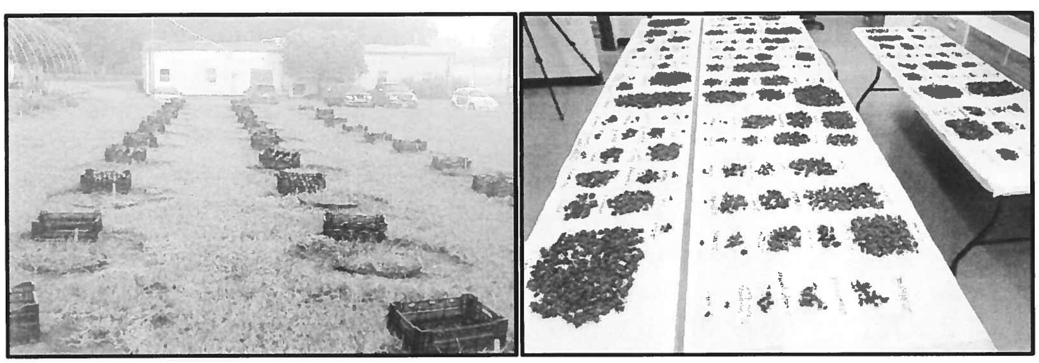

Figure 2. Yellow nutsedge tuber reduction from diclosulam applied in field. Y axis # tubers, X axis diclosulam rate.

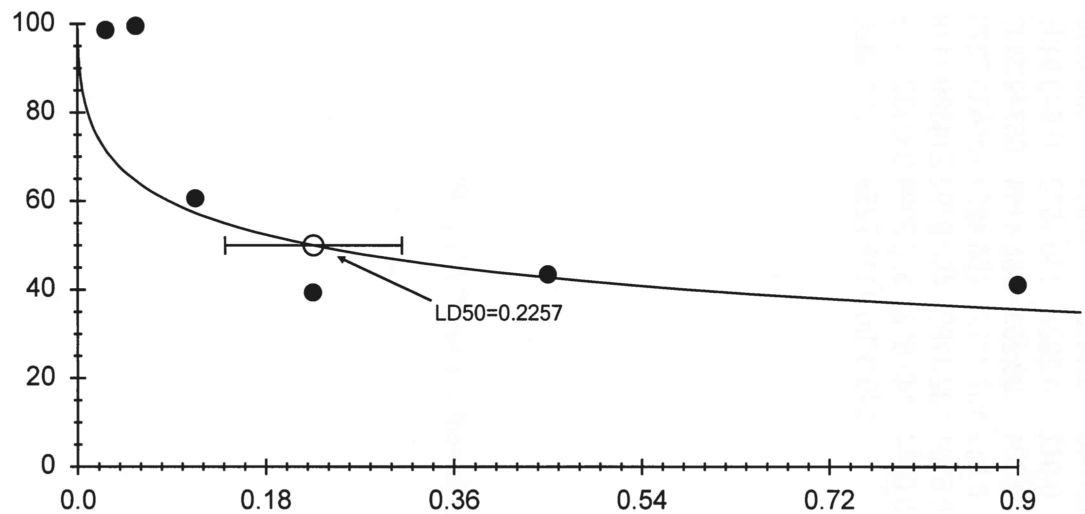

Table 1. Dose values have been scaled.  All subsequent values are in this scale.

| X=log(d) | d | n | r | p | Y | Y' | P | nP | Z^2 | w | nw | nwX | nwY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0005 | 10.0107 | 30 | 109.99 | 0.9833 | 7.128 | 6.7878 | 0.9631 | 28.8928 | 6167.7405 | 0.1048 | 3.1453 | 30.014 | 900.8379 |
| 1.3016 | 20.025 | 100 | 103.86 | 0.995 | 7.5758 | 6.2975 | 0.9028 | 90.2777 | 21.0183 | 0.042 | 4.2027 | 130.1573 | 16940.9135 |
| 1.6026 | 40.05 | 160 | 96.8 | 0.605 | 5.2663 | 5.8074 | 0.7903 | 126.4463 | 33.1447 | 0.6204 | 99.263 | 256.4164 | 65749.3839 |
| 1.9036 | 80.1 | 255 | 99.59 | 0.3905 | 4.7221 | 5.3173 | 0.6245 | 159.247 | 59.5168 | 0.619 | 157.8372 | 485.4264 | 235638.7278 |
| 2.2047 | 160.2 | 210 | 90.96 | 0.4331 | 4.8316 | 4.8272 | 0.4314 | 90.5948 | 0.0026 | 0.6301 | 132.3189 | 462.9792 | 214349.7118 |
| 2.5057 | 320.4 | 230 | 94.01 | 0.4087 | 4.7692 | 4.3371 | 0.2537 | 58.3467 | 29.208 | 0.6244 | 143.612 | 576.3094 | 332132.4433 |
| | | | | | | | | | | | 540.3790 | 1119.7259 | 2381.9896 |

| nwXX | nwYY | nwXY |
|---|---|---|
| 213.8414 | 45728.1366 | 213.9409 |
| 757.583 | 573932.0114 | 986.0493 |
| 842.6098 | 709991.2052 | 1350.3686 |
| 1204.1386 | 1449949.5906 | 2292.2375 |
| 1014.6407 | 1029495.5996 | 2236.9404 |
| 1096.9185 | 1203230.0199 | 2748.5405 |
| 2646.5634 | 13028.9170 | 5446.1169 |

X = log Dose, d = Dose, n = Sample, r = Response, p = Percent, Y = Probit
Y1 = Expected Probits, P = Expected Rates, nP = Expected Response, Z^2 = CHI Component = (r-nP)^2 / nP(1-P)
w = Weighting Coefficient, nw, nwX, nwXX, nwY, nwYY, nwXY = Calculation Table

The CHI-SQUARE value is 6310.6308

The slope of the probit line is  -0.6127
The intercept of the probit line is  6.1672
The equation is  Y = 6.1672 + -0.6127 X
ln LD50 =  1.9050
LD50 = 0.2257

95% confidence limits for LD50 = (0.3102,0.1410)