Use of weather-based spray decision models for reducing fungicide application costs on peanuts in north-western Australia

D.L. McNeil

Western Australian Department of Agriculture, Kununurra 6743 Present Address: Plant Science Department, Lincoln College, Canterbury, New Zealand

Five years of trials were conducted in the Ord Irrigation Area (OIA) to examine alternative fungicide spray strategies for leaf disease control in peanuts. A linear mode1 of yield response to constant interval scheduled sprays was significant in every season. However in 4 of 5 seasons the financial returns to fungicide use were low. Weather-based spray decision models proved significantly superior on Virginia Bunch (VB) peanuts.

Methods

All crops were grown on Cockatoo sands(1) during the wet season at the Western Australian Department of Agriculture peanut research farm in the OIA (15?45'S, 128?45'E). Crops were irrigated and managed to maximize yields(2) except for fungicide treatments. Yield data for the 1982-83 season were taken from(3). All trials were randomized complete blocks with each treatment covering 120 m^2 with the central 1/3 harvested for analysis. The trials were: 1982-83, 3 reps, 1 variety, 4 spray schedules (none and every 7, 14 and 21 days); 1983-84, 3 reps, 1 variety, 3 spray schedules (none and every 10 or 20 days); 1984-85, as for previous year but 4 reps; 1985-86, 4 reps, 4 varieties, spray schedules as for 1983-84 plus sprayed at 10-day intervals only if there had been 2 rain days with a combined rainfall > 20 mm in the preceeding 4 days or since the last scheduled spray date; 1986-87, 5 reps, 2 varieties, spray schedules as for 1983-84 plus a weather-based mode1 used in (4). The standard variety used was VB. Spraying started between 28 and 42 days after emergence and ended 1-2 weeks before harvest. Chlorothalonil was applied as Bravo (R) wettable powder at 1.275 g a.i. ha .

Results and discussion

In every season it was possible to fit a linear mode1 to yield response ($P < 0.05$ or better) relative to number of constant time interval sprays. The mode1 was significant for kernel, nut in shell and total tops yield as well as visual disease score. In 4 of 5 years the repsonse was similar in magnitude ($P < 0.01$ for a combined analysis). In the 1983-84 season the magnitude of the response was greater. These data suggested a 1.5 times return on investment in fungicide sprays in 4 of 5 years and a 5.3 times return in 1 of 5 years for VB. However across 2 years of testing, variety NC5 gave no significant return suggesting in low disease pressure years fungicide sprays were of little value on this variety.

Both weather based models gave a significant improvement over the linear mode1 ($P < 0.05$) with VB for disease score, tops, nut in shell and kernel yields. Equal disease control by all 4 criteria was achieved with 38% and 63% reductions in number of sprays in 1985-86 and 1986-87 respectively.

It thus appears likely that significant improvements to return on investment in fungicide sprays can be achieved in the OIA on VB peanuts. To do this the weather-based mode1 of (4) or a simpler local mode1 can be used.

1. Dixon, J.C., and Petheram, R.J. (1979). W.A. Agric. Dept. Tech. Bull. No. 50.

2. Western Australian Department of Agriculture (1984). Farmnote 97a. Sept, 16 pp.

3. Bell, M. (1986). Aust. J. Agric. Res. 37, 31-42.

4. Parvin, D.W., Smith, D.H., and Crosby, F.L. (1974). Phytopathology 64, 385-388.