10387 Difenoconazole + Cyprodinil

GLOBE ARTICHOKES: *Cynara scolymus* (L.)
RAMULARIA LEAFSPOT: *Ramularia cynarae* Sacc.

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Efficacy of fungicides against ramularia leafspot in annual artichoke, 2009: A fungicide trial was conducted in a commercial artichoke field in Monterey County, CA. to evaluate the efficacy and phytotoxicity of various fungicides for the control of Ramularia cynarae causing the leafspot disease. (Table1). Treatments were arranged in a randomized complete block design with 3 replications. Individual plots were 67-ft long with row and plant spacing being 6.67 and 2.5 feet respectively. . Plots were separated by a single untreated (buffer) row. The crop was in the bolting stage at the start of the trial when the artichoke buds began to appear as buttons in the fronds. The disease pressure was typically low at this stage. The plots were treated with the fungicide treatments two times at approximately 3-week interval on Jul. 10 and Jul. 31 with a backpack sprayer equipped with a 5-nozzle (TeeJet DG8006VS with 50 mesh screen) boom. The sprayer was calibrated to deliver 75 gpa under 80 psi of CO_2 pressure.

Disease Evaluation: The disease pressure remained low perhaps because of abnormally cooler and dry weather prevailing throughout the crop season. Nonetheless, the ramularia lesion began to appear on the older leaves as the artichokes buds approached the harvestable size. Because of this late incidence of the disease the buds escaped direct hit by the fungus and came clean of any lesions. Therefore, disease evaluation was made by observing the lesions on the foliage only. The disease incidence was recorded on July 31 (3-wks after the first application) and on Aug. 10 and 17 (10 and 17-days after the second spray) by examining medially located leaflets on randomly selected leaves. Twenty leaflets per plot were examined. Two methods were used to compare the efficacy of various treatments. In the first method, disease severity was assessed on a 0-4 scale, where a rating of 0 indicated no disease legions and 4 indicated more than 75% of the leaflet area covered with lesions. In the second method, the disease incidence was calculated as percent of leaflets showing any lesions (Table 2). The two types of data were analyzed by ANOVA after appropriate transformation and treatment means were separated by using F protected LSD.

Phytotoxicity evaluation: One week after each spray, the artichoke foliage in each treatment was examined for any phytotoxicity symptoms such as burning, twisting and crinkling of leaves, and stunting of plants. Artichoke buds were examined for any abnormality.

Results:

Disease evaluation: Disease severity was significantly low in all fungicide treatments as compared to control (Table 1, Fig. 1). Disease control obtained by A16001A (Difenoconazole + Cyprodinil) and A13703G (Difenoconazole + Azoxystrobin) was consistently superior in all observations as compared to other fungicide treatments. On Aug. 17 when the disease incidence was at its peak, these two fungicides were significantly superior in performance as compared with all other fungicide treatments. The trend was similar when the disease incidence (% leaflet infection) was evaluated (Table 2, Fig. 2). Rally (myclobutanil), which is the most commonly used fungicide for ramularia control in artichokes did not perform as expected and its efficacy dropped significantly below that of Quadris (Azoxystrobin), indicating that the pathogen is perhaps becoming resistant to myclobutanil after its use for a decade.

Phytotoxicity evaluation: No phytotoxicity symptoms were observed on artichoke foliage or artichoke buds (Table 2).

Table 1. Disease severity evaluation.

Treatment	Mean Disease Severity[ab] Jul 30	Aug 10	Aug 17
A16001A (Difenoconazole + Cyprodinil) 20.0 fl. oz	0.13ab	0.20ab	0.25a
A13703G (Difenoconazol + Azoxystrobin) 14.0 fl. oz	0.03a	0.10a	0.12a
Tanos (Cymoxanil + Famoxadone) 10.0 fl. oz	0.55c	1.18c	1.08c
LEM 17-069 (Penthiopyrad) 14.0 fl.oz	0.23b	0.32b	0.53b
Quadris (Azoxystrobin) 15.0 fl. oz	0.18ab	0.35b	0.55b
Rally 40W (Myclobutanil) 4.0 oz	0.30b	0.88c	0.98c
Untreated control	1.30d	1.62d	3.07d

[a]Disease severity rating: 0 = healthy; 1 = 1-25% leaf area covered with lesions; 2 = 26-50%; 3 = 51-75%; and 4 = 76-100%.

[b]Means in the same column followed by the same letter are not significantly different ($P < 0.5$, *Fisher's LSD*).

Table 1. Disease incidence (Percent infected leaflets) and phytotoxicity evaluation.

Treatment	Mean Disease Incidence[a] (% leaflet infection)			Phytotoxicity Notes
	Jul 30	Aug 10	Aug 17	
A16001A (Difenoconazole + Cyprodinil) 20.0 fl. oz	8.3a	18.3ab	25.0a	None to report
A13703G (Difenoconazole + Azoxystrobin) 14.0 fl. oz	8.3a	10.0a	11.7a	None to report
Tanos (Cymoxanil + Famoxadone) 10.0 fl. oz	38.3b	98.3cd	98.3c	None to report
LEM 17-069 (Penthiopyrad) 14.0 fl.oz	23.3ab	28.3b	53.3b	None to report
Quadris (Azoxystrobin) 15.0 fl. oz	18.3ab	35.0b	55.0b	None to report
Rally 40W (Myclobutanil) 4.0 oz	30.0ab	88.3c	91.67c	None to report
Untreated control	100.0c	100.0d	100.0c	None to report

[a] Means in the same column followed by the same letter are not significantly different ($P < 0.5$, *Fisher's LSD*).

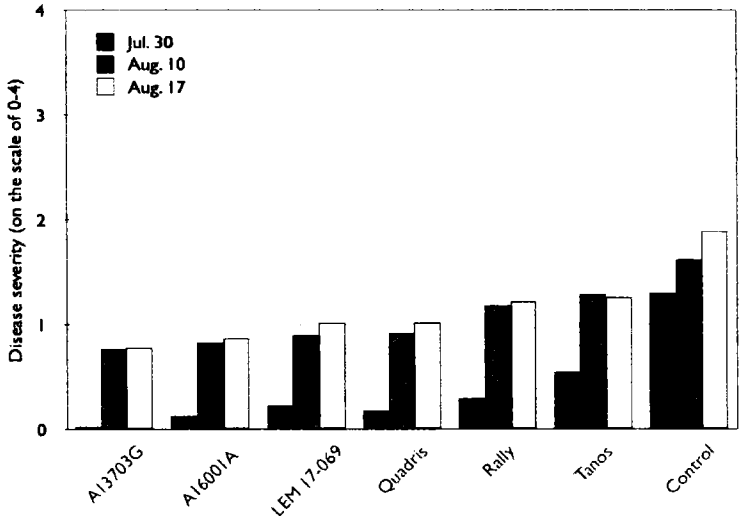

Fig. 1. Disease Severity rated on the scale of 0-4 (0 = healthy; 1 = 1-25% leaf area covered with lesions; 2 = 26-50%; 3 = 51-75%; and 4 = 76-100%).

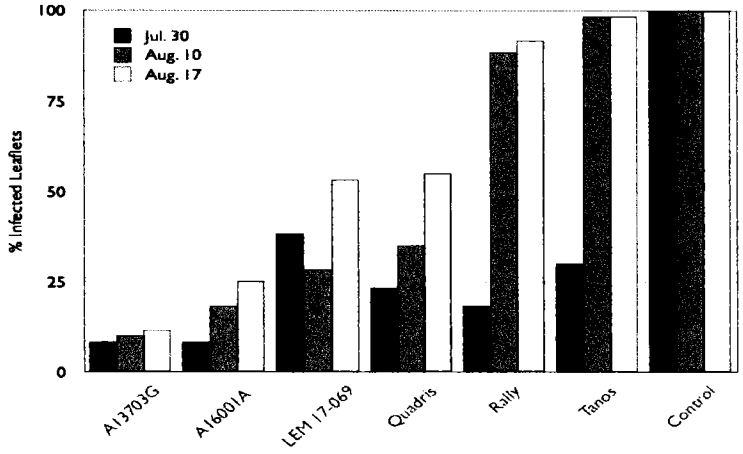

Fig. 2. Disease incidence (Percent infected leaflets)