Crop Rotation Simulation with Methyl Bromide

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A demonstration project was conducted in 1999 at the Carrington Center and in the New Rockford area to simulate the importance of crop rotation for managing soil-borne disease in wheat. Research has indicated 5 to 10 percent grain yield reduction from root and crown disease in continuous small grain and small grain-fallow sequences. Soil fumigation with methyl bromide is a demonstration tool to assess the effect of root and crown disease on small grain yield and quality. The methyl bromide simulates a recommended crop rotation where a broadleaf crop is grown between small grain crops. The soil fumigation is not physically or economically practical for farmers to use to control soil disease. Demonstration sites were selected that had two or more years of continuous small grain production. Plot size was 18 by 25 feet. Soil was fumigated with methyl bromide before wheat was planted. 'Munich' durum at Carrington and 'Gunner' HRS wheat at New Rockford were grown under recommended production management practices.

Results of the demonstration are listed in the following table. Head number was greater and plants were shorter in the methyl bromide treated plots compared to untreated plots. Also, wheat grown in the treated plots reached maturity earlier compared to untreated areas (data not shown). The data indicate seed yield and quality were greater in the methyl bromide treated plots compared to untreated plots, although root measurements indicated little difference between treated and untreated plots. Generally adequate soil moisture during the growing season likely reduced the impact of soil diseases on wheat performance in the demonstration. Also, leaf and foliar disease may have reduced the positive grain yield and quality impact expected with the methyl bromide treatment.

Table. Wheat response to soil fumigated with methyl bromide, Carrington and New Rockford

		Treated	Untreated
Heads	(number/yard of row)	116	92
Plant Height	(inches)	34	36
Seed Yield	(bu/acre)	37.8	36.3
Test Weight	(lb/bu)	58.2	57.3
Protein	(%)	16.9	15.9
1000 Kernal Weight	(grams)	7.25	6.67
Sub-crown Internode Color	(1-4)[a]	3	3
Root Color	(1-4)[a]	2.5	3
Root Mass	(1-4)[b]	2.5	2.5

[a] Sub-crown internode and root color: 1 = white, 4 = dark brown/black.

[b] Root Mass: 1 = dense, 4 = few.