

Project Title: Evaluation of chitosan on spring wheat performance – 2012

Principal investigator: Bob Stougaard

Project personnel: Brooke Bohannon

Objectives: Determine the effect of chitosan concentration and timing for disease and insect management in spring wheat.

Results:

Chitosan is thought to act as a signal to activate plant defense responses. This study was conducted to determine if chitosan possessed activity against either stripe rust or the orange wheat blossom midge. The study area had been planted to spring wheat the previous seven years and had a history of moderate orange wheat blossom midge densities. The soil type was a Creston silt loam, with a pH of 7.5 and an organic matter content of 4.5 percent. The site was fertilized with a blend of N-P-K-S at rates of 12-40-30-10 lb/A, respectively. Hank spring wheat was seeded on May 4 at a rate of 85 lb/A in 8-inch wide rows. Treatments were applied to 10 by 15 foot plots as a randomized complete block with three replications.

The factorial treatment design consisted of chitosan applied at five rates and two spring wheat growth stage. Chitosan was applied at 0, 0.25, 0.33, 0.50, and 1.00% v/v in 20 GPA of water using a CO₂ backpack sprayer. Applications were made at boot and 80% heading to coincide with the application timings for the control of strip rust and the orange wheat blossom midge, respectively. The boot treatments were applied on June 29 when the crop had a 30% strip rust infection level, while the headed treatments were applied on July 6 to coincide with peak adult female emergence.

Chitosan applications had no impact on stripe rust (data not presented). Further, chitosan treatments had no effect on orange wheat blossom midge densities (Table 2). Treatment differences were detected for yield and thousand kernel weight, but the response was erratic and did not appear to relate to the applied treatments. For example the 0 rate applied at boot stage produced a higher yield than the corresponding heading treatment. In all, chitosan had no effect on the agronomic performance of spring wheat.

Table 1. Materials and Methods - chitosan in spring wheat - 2012.

Seeding Date:	05/04/2012	Soil Type:	Creston SiL	Insecticide:	None
Seeding Rate:	80 lb/A	Soil Test:	292-34-228	Harvest Date:	08/24/2012
Previous Crop:	Spring Wheat	Fertilizer:	12-40-30-10-1		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	0.4" on 5/9 & 5/16				

Table 2. Effect of chitosan timing and concentration on spring wheat performance, Kalispell, 2012.

Timing	Rate % v/v	OWBM no/spk	Yield bu/A	Protein %	TWT lb/bu	TKW g	FN sec
Boot	0.00	43	37	14.66	54	35	362
	0.25	69	36	14.75	54	34	361
	0.33	47	33	14.46	53	32	369
	0.50	27	33	14.20	52	32	373
	1.00	28	35	14.52	52	36	362
Headed	0.00	28	33	14.35	53	33	355
	0.25	17	31	14.35	52	34	361
	0.33	37	32	14.46	53	35	344
	0.50	57	32	14.52	52	34	350
	1.00	29	33	14.60	51	35	367
	mean	38	34	14.49	53	34	360
	CV	61	4	1.84	3	4	5
	LSD	40	3	0.457	3	2	31
	TRT Pr>F	0.2576	0.0024	0.4044	0.3649	0.0397	0.7004

OWBM: Orange wheat blossom midge, TWT: test weight, TKW: thousand kernel weight, FN: falling number.