Multiple-Treatment Weed and Planting Trials

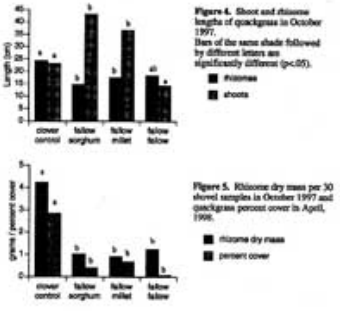
Tom and Irene Frantzen, Alta Vista, obtained a SARE Producer Grant to investigate methods of quackgrass suppression. Quackgrass is a valued forage species on the diversified Frantzen farm. However, as the operation transitions into organic production, Tom is searching for cultural controls to keep this aggressive perennial under control in row crops.

Working with University of Northern Iowa biology professor **Laura Jackson**, the Frantzens designed four combinations of practices for 1997, a year prior to corn:

1) Red clover, the control treatment representing their usual practice. The clover was seeded with oats and allowed to grow following harvest of oat hay. Grazed in the fall of 1997.
2) Summer and fall fallow. After harvest of oat hay (underseeded with berseem clover), the ground was kept bare with tillage for the remainder of the growing season.
3) Summer fallow, fall millet cover crop. Tillage after oat/berseem hay harvest until the third week of July, then millet cover crop seeded. Grazed in the fall.
4) Summer fallow, fall sorghum cover crop. Tillage after oat/berseem hay harvest until the third week of July, then sorghum cover crop seeded. Grazed in the fall.

Figure 5, shows that by the spring of 1998, the fallow treatments had significantly reduced quackgrass cover compared to the red clover control. Contrast that outcome to the trial yields shown in Table 10. The corn following red clover showed the greatest yields and the least-limiting nitrogen status, as indicated by the late spring soil nitrate test and the end-of-season stalk test. Laura Jackson concludes that in 1998 quackgrass weed pressure was not as important as other factors in determining corn yield. While one year's results are not conclusive, Jackson suggests that fallowing be reserved for the most extreme cases of quackgrass pressure, given the financial cost of fallowing and the potential soil erosion.

Click on Figure 5 for larger view



Tom writes "My fear was that removing the chemical from the control strategies would produce quack out of control!... I learned that quack comes and goes, chemical or organic.... (in 1998) "the weather provided a larger influence on the quackgrass vigor than our tillage cover crop attempts... if (quackgrass) gets really serious, then consider extensive fallow work with possibly a cover crop, but by all means watch the weather. Plan field activities aimed at quack control for times when quack is under stress."

Virginia and Marion Moser, Garrison, raise vegetables for their own CSA and a number of farmers' markets. They were looking for a better way to control weeds in sweetcorn and wanted to compare use of a rototiller (22-inch, 8-hp Troy-Bilt), a cultivator (2-row, International), and mulching with grass clippings. The trial showed significant yield differences, with the cheapest practice - cultivation - yielding the least and the most costly method - mulching - yielding most (Table 10).

The Mosers noted that the mulched corn was taller and contained more ears, and that the ears were bigger and more completely filled than the rest of the corn. Because of the greater yield, shelling the mulched corn took more labor, but the greatest labor input was applying the grass clippings to the field. From a dollars-per-acre standpoint, net profit for mulched corn was half that for cultivating and rototilling.

Another CSA market gardener is **Angela Tedesco**, Johnston. Onions were her focus. She had two questions - how to plant them and how to keep the weeds down in the beds where she grows them. The planting choices were to set out individual seedlings or to plant multiples of about four onion plants that had grown together in cell packs. The weeding issue was whether or not to supplement hand weeding with mulch, applied after the first weeding. Each of these questions is an "A or B" choice. Put them together and you have four possible combinations of treatments, forming a "two-by-two factorial" experiment.

Table 10 shows that both planting in cell-pack bunches and mulching improved yields and profitability. When the mulching and planting practices were combined, yields and profits were even better. Table 11 shows that mulching and bunch planting also improved the percentage of plants that survived transplanting and the average weight per onion harvested. The time spent in mulching was offset by labor saved in the second weeding. Planting in multiples instead of single plants reduced total labor by shortening the time needed for planting and for weeding.

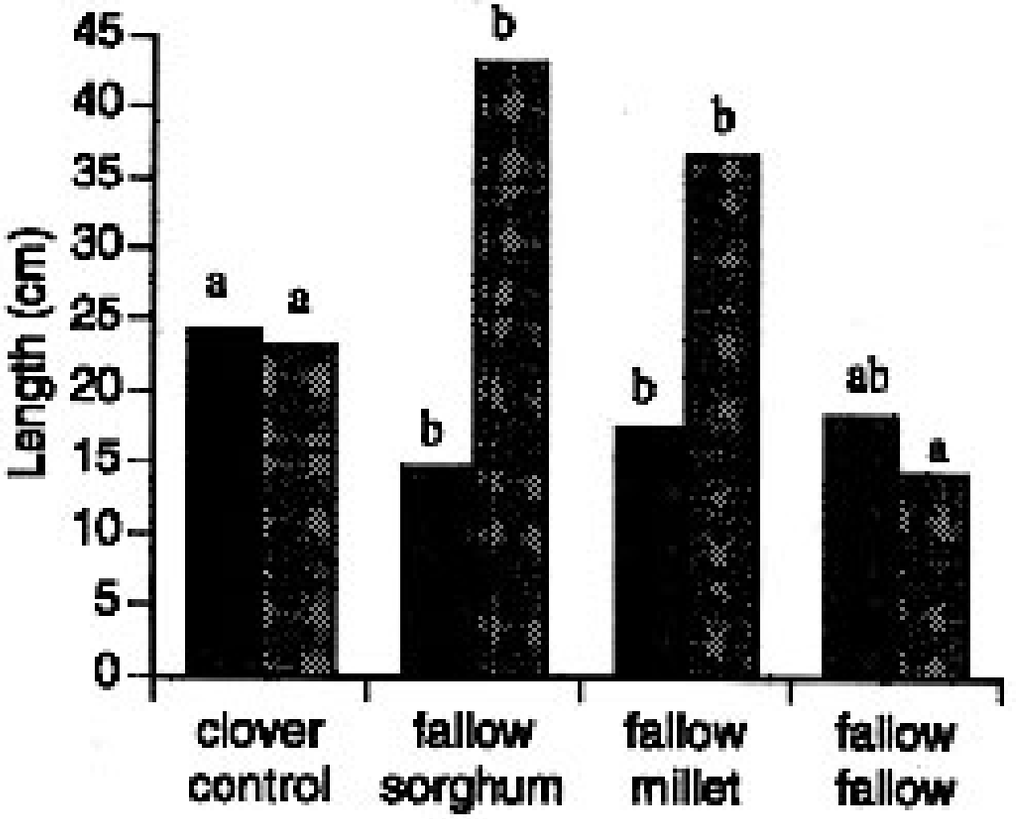


Figure 4. Shoot and rhizome lengths of quackgrass in October 1997.
Bars of the same shade followed by different letters are significantly different ($p<.05$).

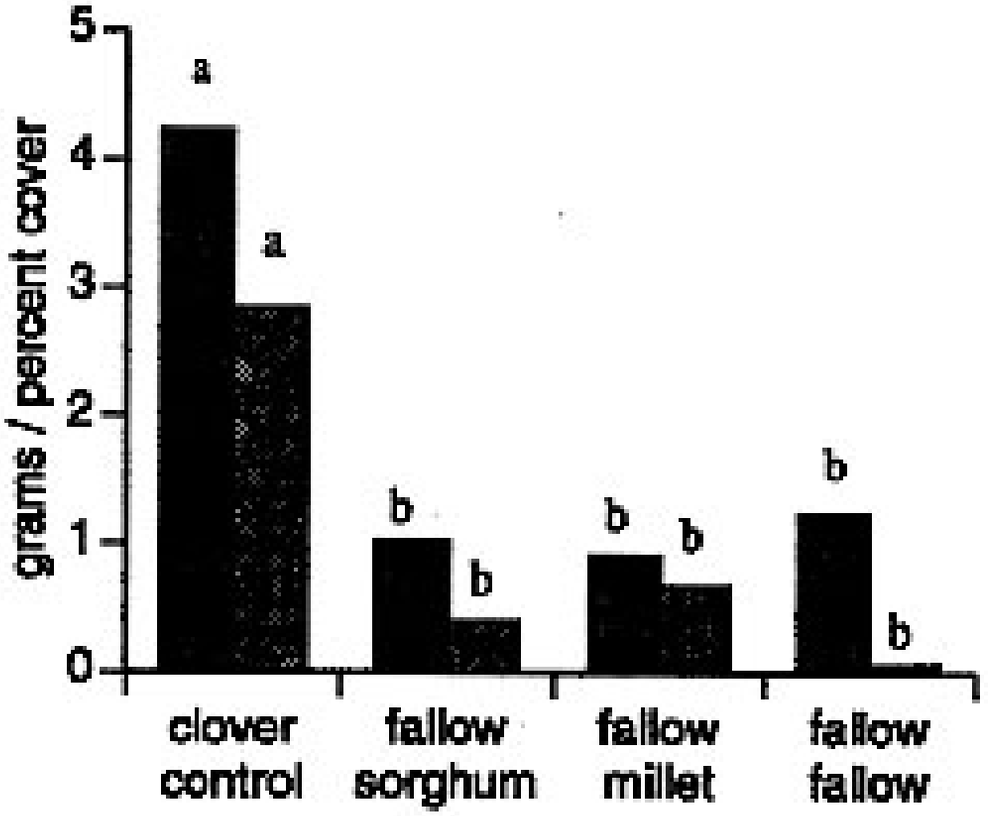


Figure 5. Rhizome dry mass per 30 shovel samples in October 1997 and quackgrass percent cover in April, 1998.

Table 10. Multiple-Treatment Weed/Planting Trials

Multiple-Treatment Weed/Planting Trials

COOPERATOR	CROP	PREVIOUS CROP	YIELD SIGNIFI-CANCE	TREATMENT "A" DESCRIPTION	TREATMENT "A" YIELD (bu. or T)	TREATMENT "A" STAT.	TREATMENT "A" TRT COSTS	TREATMENT "A" $ BENEFIT	TREATMENT "B" DESCRIPTION	TREATMENT "B" YIELD (bu. or T)	TREATMENT "B" STAT.	TREATMENT "B" TRT COSTS	TREATMENT "B" $ BENEFIT	TREATMENT "C" DESCRIPTION	TREATMENT "C" YIELD (bu. or T)	TREATMENT "C" STAT.	TREATMENT "C" TRT COSTS	TREATMENT "C" $ BENEFIT	OVERALL COMMENTS
FRANTZEN	CORN	VARIED	**	RED CLOVER CONTROL	142.8	a			SUMMER-FALL FALLOW	141.1	a			SUMMER FALLOW, FALL MILLET	131.8	b			TESTING EFFECT OF PREVIOUS FALLOW, COVER CROPS ON QUACKGRASS IN CORN
					16 LSNT		37.5 STALK			10 LSNT		28.5 STALK			13 LSNT		33.1 STALK		
														SUMMER FALLOW, FALL SORGHUM	127.5	b			
															12 LSNT		27.7 STALK		
MOSER	POPCORN	GRASS	**	ROTOTILL	1.32	b	$54.11	$56.82	MULCH	1.67	a	$117.19	$23.44	CULTIVATE	1.00	c	$31.72	$52.66	MULCH 4 WEEKS AFTER PLANTING INCREASED BOTH YIELD AND LABOR COST
TEDESCO	ONIONS	SQUASH	**	MULTIPLE/MULCH	174.7	a	$27.28	$94.98	MULTIPLE/ NOMULCH	128.1	b	$32.05	$57.64	SINGLE/ MULCH	62.5	c	$53.18	–$9.43	FACTORIAL EXPERIMENT: +/- MULCH AND PLANTING SINGLY VS. IN MULTIPLES. YIELDS IN LBS ONIONS PER 100 FT. OF BED
														SINGLE/NO-MULCH	29.0	d	$52.99	–$32.70	
	FACTOR: PLANTING SINGLE PLANTS VS. MULTIPLES		**	PLANTING MULTIPLES	151.4	a	$29.66	$76.31	PLANTING SINGLE PLANTS	45.8	b	$53.09	–$21.06						
	FACTOR: MULCH VS. NO MULCH		**	MULCH	118.6	a	$40.23	$42.78	NO MULCH	78.6	b	$42.52	$12.47						