COVER CROP MANAGEMENT FOR MINIMUM-TILL COTTON

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Experiments were conducted from 1980 to 1983 at the Tennessee Valley Substation, Belle Mina, Ala., to evaluate various aspects of cover crop management in minimum-till cotton. Cover crops included crimson clover, hairy vetch, rye, add "no cover." Cover establishment methods included (1) aerial seeding (interseeding) in late September at cotton defoliation, and (2) drill seeding in early November after cotton harvest and shallow disking. No-cover treatments (with and without shallow disking) were also established in the fall in cotton stalk residue. Spring management of covers consisted of (1) disking for conventional seedbed preparation and planting, and (2) no-till planting directly into covers. A conventional-till comparison (fall moldboard plow, spring disk/smooth) was also included.

Early establishment via aerial seeding resulted in acceptable clover stands each year, however drilled clover planted 6 weeks later was unsuccessful in 2 of 3 years due to dry or cold weather. Both seeding methods resulted in satisfactory rye stands, but drilled vetch had to be replanted in February of the initial year. Dry matter production, regardless of species, was greater following aerial than drill seeding, pointing to the benefits of early establishment (Table 1).

Nitrogen content of vetch (3.7 to 3.9%) was higher than clover (2.4 to 2.5%) and rye (1.1 to 1.2%). Nitrogen production on a per acre basis was similar for the two aerially seeded legumes and averaged 110 and 130 lb./acre in 1982 and 1983, respectively. In 1982, drilled vetch produced more N (77 lb./acre) than drilled clover (38 lb./acre) due to poor clover stands, but N production was similar for both crops in 1983.

Despite the fact that the field, which had been in conventional-tillage cotton for several decades, had no previous record of horseweed (Conyza canadensis), elimination of fall tillage with aerial seeding resulted in horseweed infestation. Horseweed seedlings were successfully eliminated even with light fall tillage. Primary tillage in the spring, i.e. disking cover crop under for conventional seedbed preparation, also eliminated horseweed. Horseweed present in no-till plots at cotton planting in 1981 was not controlled with Paraquat (2 applications at 1.0 qt./acre). In subsequent years, Roundup (1.2 qt./acre) proved effective.

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Both crop seeding methods and spring cover crop management affected cotton stands. In general, stands were lower following aerially seeded covers. Cotton stands in 1981 were reduced by no-till planting into legumes and rye compared to planting into disked under covers (Table 2). In 1982 and 1983, compared to the conventional till system, stands were reduced for cotton planted no till into legumes and following spring disking of some covers, Poor stands following spring disking were related to wet soil conditions which resulted in cloddy seedbeds.

Yield data indicated that although legume covers produced more than 90 lb./acre N, cotton benefited from additional commercial N. When cotton followed good stands of vetch, N fertilizer was not required for optimum yields in 1981 (1670 lb./acre seed cotton) and 1983 (940 lb./acre), but in 1982, 60 lb./acre N was required for no-till cotton (3060 lb./acre) and 30 lb./acre was required for conventional till (3390 lb./acre). When cotton followed clover, 30 lb./acre of N was required for optimum yield in 1981 (1650 lb./acre seed cotton) and 1982 (3040 lb./acre seed cotton), but in 1983 when yields were low (860 lb./acre), N fertilizer was not beneficial. Cotton following rye required 60, 90, and 60 lb./acre N for optimum yields in 1981 (1750 lb./acre), 1982 (3240 lb./acre), and 1983 (1100 lb./acre), respectively. Related research suggests that desiccation of covers a week or more prior to planting may facilitate planter operation, cotton stand establishment and seedling growth.

In summary, aerial seeding at the time of cotton defoliation resulted in successful cover establishment and was especially advantageous for legumes. Aerial seeding disadvantages for subsequent no-till planting of cotton included horseweed infestation due to elimination of fall tillage and cotton stand problems related to increased dry matter.

Table 1. Influence of cover and seeding method on cover production (averaged over years).

Cover	Seeding method	Dry matter	N content	N production
		(lb./acre)	(%)	(lb./acre)
Clover	Aerial	3910	2.4	119
	Drill	1190	2.5	39
Vetch	Aerial	2650	3.9	119
	Drill	1630	3.7	67
Rye	Aerial	2530	1.1	24
	Drill	1670	1.2	18

Table 2. Influence of covers and spring tillage on cotton stands.

Cover	1981		1982		1983	
	NT	Conv.[1]	NT	Conv.[1]	NT	Conv.[1]
	(no./50 ft. row)					
Clover	140	169	113	129	101	98
Vetch	68	153	104	94	109	99
Rye	97	145	134	88	141	109
No cover	192	196	130	118	126	174
Conventional till[2]	--	213	--	142	--	138

'Consisted of spring disking of covers to prepare seedbed.

'System included fall moldboard plowing, spring disking/smoothing