



# Extension FactSheet

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## Value of Legumes for Plowdown Nitrogen

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The use of legumes for plowdown green manure is an accepted practice in many parts of Ohio for improving soil tilth and erosion control. With the current interest in improving our environment, this practice could receive renewed emphasis. As the cost of inorganic sources of nitrogen increases, more farmers are considering the use of legumes in their crop rotation to supply some of the nitrogen required for row-crop production.

Red clover or red clover-sweetclover mixtures are commonly overseeded in winter wheat during early spring. Sometimes legumes for plowdown are seeded in oats. In most cases, the legume is plowed the following spring preceding corn; however, at times the soil is plowed in late fall or early winter of the seeding year.

Roots left in the soil following the removal of various crops have an effect on future soil productivity. There can be a wide variation in the yield of roots and tops within a plant species. This variation is influenced by crop management and weather. Severe cutting or pasturing of a crop reduces the amount and depth of roots. Dry weather slows top growth and tends to increase the ratio of roots to tops. Weather or any other factor that encourages top growth tends to reduce the weight of roots in proportion to that of the tops (Table 1).

The soybean has a low weight of roots when compared with the red clover-sweetclover or the perennial following several years of hay production. Similar variation exists in the amount of nitrogen produced per acre.

A summation of 14 years of Ohio data indicates corn yields following alfalfa and sweetclover were equal when both crops were plowed down one year following seeding. Mammoth and medium red clover were not as productive. Table 2 shows how the nitrogen and dry matter in legume roots and tops vary with the stage of growth. Leguminous green manure crops ordinarily are plowed under sometime between April 15 and May 15 the year following seeding. At this time, the total nitrogen content per acre is highest for sweetclover, slightly less for alfalfa, and considerably less for red clover.

**Table 1. Root Weight per Acre and Nitrogen Content.**

Crop	Time of Sampling	D.M. Weight	Nitrogen
		(lb.)	(lb.)
Red Clover	Averaged 48 dates	1,000	22
Alfalfa	Late fall, seeding year	1,270	35
Alfalfa	Late fall, first hay year	2,680	61
Alfalfa	Late fall, second hay year	3,400	78
Sweetclover	November, seeding year	2,640	95
Sweetclover	July, yr. following seeding	800	13
Korean lespedeza	August 15	560	8
Soybeans	Pods well filled	550	8
Bromegrass	July, 2-year-old sod	3,740	—
Timothy		5,000	93
Bluegrass	Old sod	*6,770	142
Perennial ryegrass	Sown in corn and sampled following spring, before plowing	*6,000	42

\*Includes all underground parts, as well as, true roots.

**Table 2. Nitrogen and Dry Matter in Legume Roots and Tops Vary With the Stage of Growth. Seeded in oats in Early Spring and Not Clipped After Oats Harvest. Columbus, Ohio.**

Plant Part	Air-dry Forage Yield/Acre (lb)			Nitrogen/Acre (lb)		
	Redclover	Alfalfa	Swt.clover	Redclover	Alfalfa	Swt.clover
<b>October 1 of Seeding Year</b>						
Tops	2,490	1,670	2,280	66	47	63
Roots	500	1,080	1,760	13	29	58
Total	2,990	2,750	4,040	79	76	121
<b>Early November of Seeding Year</b>						
Tops	2,050	1,350	1,550	50	39	34
Roots	940	1,270	2,640	24	35	95
Total	2,990	2,620	4,190	74	74	129
<b>April 24 to May 12 of Year Following Seeding</b>						
Tops	2,010	2,500	2,100	58	83	78
Roots	900	1,110	1,170	20	25	37
Total	2,910	3,610	3,270	78	108	115
<b>May 24 to June 22 of Year Following Seeding</b>						
Tops	4,360	4,040	5,400	108	103	130
Roots	1,050	1,450	1,080	22	33	25
Total	5,410	5,490	6,480	130	136	155

Table 3 indicates the nitrogen reduction incurred when sweetclover is clipped the seeding year. Sweetclover is a biennial capable of making large top growth during the season it is seeded. Any clipping or pasturing which reduced top growth of first-year sweetclover has a corresponding effect on root development.

**Table 3. Reduction in Nitrogen of Sweetclover When Clipped. Harvested November 1, Columbus.**

Height Clipped in July (in.)	Yield/Acre* (lb)		Nitrogen/Acre (lb)		
	Tops	Roots	Tops	Roots	Total
Not cut	2,940	3,630	47	127	174
14-16	1,900	2,760	40	99	139
7-8	1,130	1,830	25	68	93
2-3	630	1,090	14	37	51

\*Air dry

Clipping sweetclover the seeding year does NOT kill it, if clipped high. Crown buds develop at the base of the plant during the early fall season. These buds grow the following spring and produce the second year's growth.

Table 4 presents some work conducted at the North Central Branch of the Ohio Agricultural Research and Development Center (OARDC) near Castalia, Ohio. These plowdown crops and mixtures are used over a wide part of Ohio. Even though these crops produce large amounts of nitrogen by June 5, plowing at this late date for corn production is not recommended. Corn yields are usually reduced so that a producer will not have a good financial return above cost of production.

**Table 4. Yield and Amount of Nitrogen Produced by Four Legume Combinations at Two Dates.**

Plowdown Crop	D.M. Yield/Acre		Nitrogen/Acre	
	May 15	June 5	May 17	June 5
	-tons-		-lb-	
20% mammoth, 80% sweetclover	0.82	2.24	60	108
60% mammoth, 40% sweetclover	0.77	2.00	56	96
Domestic mammoth red clover	1.08	2.12	78	102
Canadian mammoth red clover	0.86	2.00	63	96

Numerous agronomic conditions in Ohio could benefit from the use of legumes or other green-manure crops. The crop rotation, availability of seed and seeding equipment, and cost and availability of inorganic source of nitrogen may affect a producer's decision to use green-manure crops.

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