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Cover Crop Database

Hairy Vetch

Images of Hairy Vetch

Summary

- Winter-annual legume
- Many cvs, including 'Madison', 'Winter', 'Hairy', and the Òdasycarpa" forms 'Auburn',
- 'Oregon', and 'Lana'.
- Native to Europe and Asia.
- Height 12-20" in monoculture; taller where it climbs cereals.
- Biomass 4,300-7,000 lb/acre
- N content about 4.0%
- Harbors pea aphid (Acyrthosiphon pisum) and associated aphidophagous insects
- Flowers harbor flower thrips (Frankliniella spp.) and minute pirate bug (Orius tristicolor)
- Used as cover crop in orchards, vineyards, and in rotation with vegetable and field crops
- Can be managed to re-establish itself in orchards and vineyards
- Used in mixtures with 'Magnus' and 'Miranda' field peas, cereals, and bell bean.

Common Name

Common names are hairy vetch, sand vetch, winter vetch, and woolypod vetch (Duke, 1981). The species has also been termed wooly vetch (Hermann, 1960), Russian vetch, or Siberian vetch (Goar, 1934).

Scientific Name

Vicia villosa Roth (Duke, 1981); *Vicia villosa* and *Vicia dasycarpa* are now merged into *Vicia villosa* (Duke, 1981).

Cultivar

According to Duke (1981), *Vicia villosa* includes 'Madison Vetch,' 'Winter' vetch, and 'Hairy' vetch, and the "Dasycarpa" forms 'Auburn,' 'Oregon,' and 'Lana.'

Seed Description

Seeds globose, 3 to 4.5 mm. in diameter, black, the hilum encircling 1/7 of the circumference (Hermann, 1960),

According to Goar (1934), seeds are small, spherical, nearly black, and very irregular in size.

Seedling Description

Vetch is relatively large seeded and able to establish even in orchards with heavy leaf deposition (e.g., walnut or pecan) (Bugg, pers. obs.) Seed of hairy vetch is smaller than common, purple and 'Lana', therefore seeding rate may be reduced by 15% (Fred Thomas, pers. comm.)

Mature Plant Description

Duke (1981) described hairy vetch as a straggling, climbing, prostrate or trailing annual, biennial, or perennial herb. In California, Munz (1973) stated that this species behaves as an annual or biennial. The herbage including the leaves and stem can be hairy or smooth. Flowers are blue and are borne in loose racemes, inflorescences borne on long stems or peduncles. Leaves are compound, made up of several pairs of leaflets; there is no terminal leaflet (Madson, 1951).

A description by Hermann (1960) indicates that stems are spreading-villous, up to a meter long; leaflets usually 10 to 20, narrowly oblong to linear-lanceolate, obtuse and mucronate to acute, 1 to 2.5 cm. long; peduncles elongate; racemes dense, 10- to 40- flowered, secund, plumose in bud; flowers 12 to 20 mm. long; calyx irregular, villous, the tube 2.3 to 4 mm. long, gibbous at the base on the upper side, the pedicel apparently inserted ventrally, the lower teeth linear-acicular, long-villous, 2 to 5 mm. long, the upper linear-triangular 0.8 to 1.5 mm. long; corolla violet and white to rose colored or white, slender, the blade of the glabrous standard less than hal as long as the claw; pod oblong, 2 to 3 cm. long, 7 to 10 mm. broad, obliquely beaked.

According to Goar (1934), stems often reach 12 feet in length. Its viny habit prevents it from being more than 3 or 4 feet tall unless grown with oat or some other supporting crop. From 9 to 17 pairs of narrow leaflets constitute the leaf, which is determinated by a tendril. Twenty to thirty blue-violet flowers are borne on one side of a long flower stem. The stems and leaves have many long hairs.

Temperature

Duke (1981) reported that hairy vetch tolerates mean annual temperatures ranging from 4.3-21.1 C, with a mean of 42 cases of 12.0. Duke (1981) also recounted briefly the history of hairy vetch breeding and seed production in the U.S. The 'Madison Vetch' variety was developed in Nebraska, and is apparently cold tolerant. Cold-tolerant forms of hairy vetch were grown in Michigan, but production shifted to Oregon, where more glabrous, heat-tolerant forms have dominated. The latter forms are used in the Southeast, and include dasycarpa varieties, such as 'Auburn', 'Oregon', and 'Lana.' This seems to suggest that the most cold-tolerant forms are less available now than formerly. Hairier varieties are typically more winter hardy (McLeod, 1982), but this correlation does not always hold (Duke, 1981). Hairy vetch has been termed the most winter hardy of the cultivated vetches (McLeod, 1982), but Marianne Sarrantonio (pers. comm.) stated in 1992 that bigflower vetch (*Vicia grandiflora* Scop. *kitaibeliana* W. Koch, cv 'Woodford') is more cold tolerant than any of the many hairy vetch accessions that she has evaluated at Rodale Institute Research Center (Kutztown, Berks County, Pennsylvania).

In the south, hairy vetch does not renew growth during the temporary warm spells, and consequently, is not as likely to be killed by severe frosts later (McLeod, 1982). Hairy vetch is said to be unlike other vetches in its extreme winter hardiness (Madson, 1951); it is seldom, if ever, winter-killed in California (Goar, 1934) and is more cold-tolerant than crimson clover. (Hargrove, 1986). At high elevations, if established before the ground freezes, it will remain dormant during the winter and renew growth when the soil thaws out in the spring. In the valleys where winters are not severe, it will go dormant with little growth until the spring (Madson, 1951).

Geographic Range

Duke (1981) stated that hairy vetch is native to Europe and Asia, ranging from the Boreal Moist to Wet through Subtropical Moist Forest Life Zones. It is a frequent escape in much of the U.S. and Canada where it is found in roadsides and waste places. Munz (1973) wrote that it is naturalized in waste places from central California north but is less common in southern California. It can grow in all areas of the US, during the cool, moist season, according to McLeod (1982).

As recounted by Duke (1981), many varieties of hairy vetch have been developed for specific areas. Cold-tolerant hairy forms prevailed in Michigan, where seed production originally centered. 'Madison Vetch' was developed in Nebraska, 'Auburn' in Alabama, 'Oregon' in California, and 'Lana' in Oregon. 'Winter' vetch is glabrous and tolerant of the southern winter.

Water

According to Duke (1981), hairy vetch tolerates annual precipitation ranging from 3.1-16.6 dm, with a mean of 42 cases being 8.1). Hofstetter (1988) stated that the species grows best when rainfall exceeds 30 in/yr.

Goar (1934) mentioned that hairy vetch is more drought resistant than other vetches, yielding well where other species fail. During winter, it produces little above-ground growth, but its root development continues, accounting for its drought resistance. Where rainfall is late, pre-irrigation about October 1 is important. In the Sacramento and San Joaquin valleys, on soils of good water-holding capacity, no additional irrigation is typically required. An irrigation in April is sometimes necessary. On lighter soils, three to five irrigations are often necessary. In coastal and foothill areas, normal rainfall alone usually suffices (Goar, 1934).

A study by Zachariassen and Power (1991) indicated that crimson clover showed a consistently-higher water use efficiency (g of dry matter produced per liter of water evapotranspired) than hairy vetch at 10, 20, and 30C. Sweet clover showed intermediate values.

Nutrients

Vetch, as with most legumes, does well with supplemental phosphorus and sulfur. (Fred Thomas, pers. comm.)

Soil pH

According to Duke (1981), hairy vetch tolerates soil pH ranging from 4.9-8.2 with a mean of 40 cases being 6.6, and it is reputed to be tolerant of high pH. Hofstetter (1988) stated that the species grows best when pH is from 6.0-7.0.

Hairy vetch can grow on acid soils that will not sustain clover and alfalfa, and it tolerates alkaline soils (McLeod, 1982).

Soil Type

Duke (1981) stated that hairy vetch does best on sandy or sandy loam soil. Sandy loam was recommended by Madson (1951), and Goar (1934), stated that although the species is especially adapted to lighter sandy and sandy-loam soils, and that it does well on light soils where other varieties fail, it succeeds on most soil types, if drainage is good. McLeod (1982) agreed that it can grow on any well drained soil, even infertile soil.

Do not overseed vetch into corn when soil moisture is scant or on shaley, shallow or crust-prone soils (Hofstetter, 1988).

Shade Tolerance

Hairy vetch is shade tolerant, according to Brinton (1989). It has been successfully overseeded into standing corn and used as an understory cover crop in vineyards and orchards (Bugg, pers. comm.).

Salinity Tolerance

No information is available in this database on this topic.

Herbicide Sensitivity

Paraquat (0.6 kg ai/ha) and HOE-39866 (0.8 kg ai/ha) gave control of crimson clover and hairy vetch regardless of the date of application (Griffin and Dabney, 1990).

White and Worsham (1990) evaluated eight herbicide treatments for hairy vetch and another eight for crimson clover under no-till management preceding corn and cotton. Preceding cotton, the treatments were: (1) Paraquat, (2) Paraquat + 2,4-D, (3) Paraquat + cyanazine, (4) Glyphosate, (5) Glyphosate + 2,4-D, (6) Glyphosate + cyanazine, (7) 2,4-D, (8) Cyanazine. Preceding corn, the treatments were: (1) Paraquat, (2) Paraquat + 2,4-D, (3) Paraquat + dicamba, (4) Glyphosate, (5) Glyphosate + 2,4-D, (6) Glyphosate + dicamba, (7) 2,4-D, (8) Dicamba. Paraquat alone of in combination with dicamba, 2,4-D or cyanazine, and cyanazine alone were the best controls for crimson clover. Glyphosate alone was relatively ineffective at controlling hairy vetch in corn; all other treatments were effective against hairy vetch in corn. In cotton, the only treatments that worked well against hairy vetch were 2,4-D or cyanazine alone, or combined with glyphosate.

Life Cycle

Duke (1981) reported that hairy vetch can behave as a perennial, biennial, or annual, and Munz (1971) stated that in California it behaves as an annual or biennial. McLeod (1982) stated that it is an annual legume that often acts as a biennial. Goar (1934) stated that the species is annual in habit of growth when fall-planted, and it is a winter annual in Georgia (Bugg et al., 1989). In coastal central and northern California, it can be planted during the spring and grown as a summer annual cover crop (Richard Smith, pers. comm.). In the Sacramento Valley, it can be sown as early as August, if irrigation is available (Mark Van Horn, pers. comm.).

Hairy vetch grows little during the winter, but rapidly in the spring (Goar, 1934).

Seeding Rate

Seeding rates for hairy vetch have been given as 33 lbs/acre (to result in 12 vetch seeds per square foot, or 522,720 seeds per acre) (Goar, 1934); 30-45 lb/a (Brinton, 1989); 40 to 50 lbs/acre (Madson, 1951; Miller et al., 1989); and 40-60 lb/acre (McLeod, 1982). 25-30 lb/acre is suggested when hairy vetch is drilled after small grains, and 40 lb/acre when overseeded into corn or soybeans (Hofstetter, 1988).

Seeding Depth

Seeding depths have been given as 3/4 inches (McLeod, 1982), 1/2-3/4 inches (Slayback, pers. comm.), and 1.5-2.5 inches according to moisture conditions, or deeper if necessary (Goar, 1934).

Seeding Method

Seedbed should be firm. On dry-farmed, summer-fallowed land, soil should be tilled lightly after the first rains in the fall to destroy the first flush of weeds and prepare the seed bed. Where rainfall is late, pre-irrigation about October 1 can be followed by disking or spring-tooth harrowing and rolling, floating to smooth the surface, and vetch can be sown by October 15 (Goar, 1934).

Goar (1934) recommended drilling over other methods because it distributes the seeds more evenly and places them at a more uniform depth in the soil, resulting in better germination and stands. If no grain drill is available, the seed may be broadcast.

Madson (1951) stated that, following pre-irrigation, seed should by drilled deep enough to contact moist soil. Depth can be 2 inches, but late seedings should be closer to the surface.

When overseeding into corn, seed 40 lb/acre at last cultivation on freshly-disturbed soil, not before cultivation (Hofstetter, 1988).

When seeding following small grains, light soil preparation is needed, with a seeding rate of 25-30 lb/acre (Hofstetter, 1988).

Scott and Burt (1985) reported trials in New York state, wherein various cover crops evaluated after overseeding into corn 6-18" high. Cover crops considered were medium red clover, mammoth red clover, alfalfa, yellow sweetclover, alsike clover, birdsfoot trefoil,

Canada field peas, Austrian winter peas, cowpeas, perennial or annual ryegrass, medium red clover + ryegrass, or medium red clover + rye. Of these, alfalfa, medium red clover, yellow sweetclover, hairy vetch, ryegrass, and medium red clover + ryegrass performed well.

Seeding Dates

According to Goar (1934), seeding should be done in the fall, October or November, in the interior valleys. If the crop is to be used for both pasture and hay, seed on or before October 20. In coastal and foothill sections, seeding may be safely delayed. In Marin and Alameda counties, December-January 1 seedings may work. Lacking irrigation seeding is often delayed until after the first rains. Under summer-fallow where weeds are not severe, the seeding may be done in the "dust".

According to Madson (1951), in California, hairy vetch should be sown from October through November. If seeding is delayed until after the first fall rain, which may not come until November or December, the soil may be so cold that the stand will be poor. Hofstetter (1988) suggested that sowing be at least 40 days (preferably 50 or 60) before the first killing frost.

In coastal central and northern California, it can be planted during the spring and grown as a summer annual cover crop (Richard Smith, pers. comm.). In the Sacramento Valley, it can be sown as early as August if irrigation is available (Mark Van Horn, pers. comm.).

John France (pers. comm.) of Porterville, Tulare County, seeded pea/vetch (hairy and common)/oat mixtures into citrus (orange) understories in late November or during December. The winter dormancy expressed by hairy vetch and field pea allow a high proportion of bare ground to remain, which presumably makes orchard temperatures warmer during the critical frost period (February).

McLeod (1982) stated that hairy vetch is the only vetch recommended for fall sowing in the North. Marianne Sarrantonio (pers. comm.) stated that bigflower vetch shows even greater cold tolerance than any available hairy vetch lines; thus, this form may also be suitable for fall sowing.

When overseeding hairy vetch into soybeans, Hofstetter (1988) recommended 40 lb/acre at early leaf- yellowing or early leaf-drop (30-40 days before killing frost).

Inoculation

Hairy vetch requires inoculant type "C" (Nitragin Co.) (Burton and Martinez, 1980; Duke, 1981).

Seed Cost

The price of hairy vetch seed was about $1.25 per pound retail in California during 1992-1993 (Fred Thomas, pers. comm.).

Seed Availability

Hairy vetch seed is widely available from commercial suppliers (Bugg, pers. obs.).

Days to Flowering

In California, flowering of hairy vetch takes place from April through July (Munz, 1973). In northern California, autumn-sown hairy vetch typically starts flowering in early to mid April, continuing well into July if water is adequate (Bugg, pers. comm.). In coastal Massachusetts, hairy vetch sown on May 7 began flowering in mid July, with peak flowering occurring about August 18 (Bugg and Ellis, 1990).

Days to Maturity

In California, fall-sown hairy vetch has mature seed by mid to late May (Bugg, pers. comm.); the plant is indeterminate and can continue or resume flowering into July, if moisture is available. Hairy vetch does not mature as early as bur medic and has been regarded as a late-maturing (early June) (Bugg et al., 1989).

Seed Production

Duke (1981) recounted briefly the history of hairy vetch breeding and seed production in the U.S. The 'Madison Vetch' variety was developed in Nebraska, and is apparently cold tolerant. Cold-tolerant forms of hairy vetch were grown in Michigan, but production shifted to Oregon, where more glabrous, heat-tolerant forms have dominated. The latter forms are used in the Southeast, and include dasycarpa varieties, such as 'Auburn', 'Oregon', and 'Lana.' This seems to suggest that the most cold-tolerant forms are less available now than formerly.

Hairier varieties are typically more winter hardy (McLeod, 1982), but this correlation does not always hold (Duke, 1981). Currently, hairy vetch is grown for seed in Western Oregon (McLeod, 1982).

The Southern Seedsmen's Association 1990-91 Directory and Buyers' Guide listed 39 commercial suppliers of hairy vetch seed.

including including 12 from Oregon. Duke (1981) mentioned that in the U.S., most seed is produced in Oregon, Oklahoma, Texas, Arkansas, and western Washington.

Hairy vetch volunteers readily if allowed to mature seed, particularly preceding a cereal grain crop. There is not danger of it becoming a weed in grain fields, however, if it is harvested before the seed pods become filled (Goar, 1934).

Seed Storage

Hairy vetch seed remains viable for a relatively long time (McLeod, 1982).

Growth Habit

Duke (1981) described hairy vetch as a straggling, climbing, prostrate, or trailing annual, biennial, or perennial herb. Madson (1951) stated that the species produces coarse viny vegetation of moderate to heavy density. It seldom attains a height of more than 3 or 4 feet except when supported by oat or some other companion crop (Goar, 1934).

Maximum Height

Hairy vetch seldom attains a height of more than 3 or 4 feet except when supported by oat or some other companion crop (Goar, 1934). In southern Georgia, hairy vetch (cv W67-HU-704) reached a maximum height of 51.69 +/- 1.59 cm (20.35 +/- 0.63 inches) (Bugg et al., 1990). Sown on October 19 in Mendocino County, 'Lana' woollypod vetch attained a height of 67.31 +/- 4.21 (26.50 +/- 1.66 inches) by May 2 (Bugg et al., unplublished data). Sown in May, hairy vetch (in biculture with cereal rye) reached about 30 cm (11.81") in coastal Massachusettes (Bugg and Ellis, 1990).

Root System

Hairy vetch has a taproot that extends to a depth of 1-3 ft (Brinton, 1989). McLeod (1982) considered hairy vetch shallow rooted. Goar (1934) mentioned that hairy vetch is more drought resistant than other vetches, yielding well where other species fail; during winter, it produces little above-ground growth, but its root development continues, accounting for its drought resistance.

Kutschera (1960) reported that hairy vetch generally roots to a depth of 30-85 cm.

Establishment

Hairy vetch benefits from the usual recommended practices for establishing cool-season annual legumes in California: (1) inoculate see properly with viable rhizobia of the correct strain (strain "C" for hairy vetch); (2) prepare a good seedbed or mow competing vegetation closely immediately prior to seeding; sow by October 15; (3) seed in mixtures with other legumes and grasses; (4) use a drill to seed, or disk, broadcast, and cultipack; and (5) irrigate promptly following seeding, making sure that good soil moisture is maintained during germination and early growth (Bugg, pers. comm.). When overseeding hairy vetch into soybeans, late summer/early fall rain is important in ensuring good establishment and winter-hardiness (Hofstetter, 1988).

Maintenance

Hairy vetch will volunteer if allowed to mature seed (McLeod, 1982). Strip mowing or tillage in an orchard understory can permit remnant stands to reseed the entire orchard, especially if rotary mowers are used to scatter seed following maturation; avoid direct placement of N-rich fertilizers on areas (e.g., alleys) devoted to hairy vetch (Bugg et al., 1991).

Abdul-Baki and Teasdale (1993) described a production system for fresh market tomatoes in Maryland, involving mulches produced by mowing either hairy vetch or subterranean clover, or of horto paper or black polyethylene plastic on preformed beds. A high-speed flail mower was used to convert the two winter-annual, September-sown cover crops to mulch. Tomato seedlings were transplanted on May 1 or 8. Black polyethylene plastic mulch led to the best early production but overall yield was best with hairy vetch. Subclover was less winter-hardy.

Mowing

Hairy vetch can be killed by close mowing at peak flower (Luna and Rutherford, 1989). Mowing high, e.g., 10 inches or greater, can rejuvenate flowering vetch (Cantisano, pers. comm.).

Early spring mowing at 1-2 inches can be done without harming hairy vetch because it is slow to grow early, as observed in walnuts in Biggs, CA when mowed at 1 inch to shred walnuts on March 13. (Fred Thomas, pers. comm.)

Incorporation

Due to its winter and early spring dormancy, hairy vetch was deemed by Madson (1951) unsatisfactory where covercrop must be plowed in early. If incorporation can be delayed until early May, it produces good biomass.

The same rules apply in incorporating hairy vetch as with other vetches. Mowing prior to discing can aid in incorporating and prevent light-weight tillage implements from being entangled by the viny vetch (Bugg, pers. comm.).

In a replicated trial recounted by House (1989), corn was grown following no-till or conventionally-tilled winter cover crops of hairy vetch, crimson clover, or wheat. Hairy vetch harbored a more abundant and diverse below-ground arthropod fauna (herbivores and predators) than did crimson clover or wheat. Elateridae, Curculionidae, and Carabidae were particularly abundant following no-till hairy vetch. Scarabaeidae were especially abundant following conventionally-tilled clover. Elateridae (wireworms) were the dominant herbivores in no-till systems. Observed faunal differences had dissipated by July.

Harvesting

When hayed, vetch should be cut in full bloom. Vetch leaves dry much faster than the stems, so unless the hay is processed promptly in the field, leaves drop off. Usually one day in the swath is sufficient, then the hay is put in shocks to complete curing (Goar, 1934).

Equipment

The same rules apply in incorporating hairy vetch as with other vetches. Mowing prior to incorporating can prevent light-weight tillage implements from being entangled or slowed by the viny vetch (Bugg, pers. comm.). Tillage implements used successfully with unmowed hairy vetch include rotovators, heavy disk harrows, and power spaders (e.g., Celli). Flail and rotary mowers are useful, but sickle-bar mowers should only be used when the vetch is well supported by a cereal companion crop, and the cover crop is dry. Otherwise, the sickle-bar mower may become entangled (Bugg, pers. comm.).

Uses

Hairy vetch is useful as forage, hay, silage, green manure, and in cover crops (Duke, 1981; McLeod, 1982).

In California, its cold-induced dormancy makes hairy vetch less desirable as a winter cover crop than common or purple vetch because it grows little in the winter (McLeod, 1982). Similarly, the scant top growth during cold weather reduces its value as winter pasture (Goar, 1934).

In a three-year field trial conducted by Tomar et al. (1988) at two sites (Ormstown site and Ste. Rosalie) in southeastern Quebec, corn ('DeKalb W-844') was grown with a simultaneously-seeded intercrop of mixed alfalfa, hairy vetch, and red clover. Control plots had corn but no legumes. Nitrogen (as urea) was applied to the surface at 0, 70, and 140 kg/ha in plots with and without legume intercrops. Simultaneous intercrops suppressed corn yields by 15-27% depending on the year and the site. Overall, legume intercrops reduced corn yield by about 2 Mg/ha. Mean legume yields were highly variable, did not vary significantly due to rate of applied nitrogen, and ranged from 342 - 1011 kg/ha at the Ormstown site and from 442-1252 kg/ha at Ste. Rosalie.

Mixtures

Hairy vetch is often grown with wheat, oat, or rye; these grasses act as nurse crops (McLeod, 1982). The cereals also provide structural support to the legume: oat is typically used, but rye, wheat, or barley are also encountered (Goar, 1934). Vetch or Austrian winter pea is good in mixtures with oat in California because maturation is simultaneous. (Goar, 1934).

As described by Luna and Rutherford (1989), Hairy vetch (20 lb/a) and cereal rye (70 lb/a) can be grown in biculture in the winter, then managed no-till by mowing (rather than herbicides) and the residue manipulated to suppress weeds yet allow development of a crop of corn. Surface-feeding Lumbricidae (earthworms) are apparently responsible for ensuring efficient availability of nitrogen to the economic crop. This system has been perfected for Virginia and may prove useful elsewhere, with some modifications.

Schenk and Werner (1991) reported that various legumes in the tribe Vicieae (peas, lentils, and vetches) contain Beta-(3-isoxazolinonyl) alanine, which is released into soil as a root exudate and apparently is an allelopathic compound. This chemical can reduce growth in seedlings of various grasses and of lettuce. Pea was only slightly affected.

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Ranells and Wagger (1997b) conducted a replicated field trial on N-dynamics of the following monocultural and bicultural cover crops: (1) cereal rye; (2) crimson clover; (3) hairy vetch; (4) cereal rye/crimson clover; and (5) cereal rye/hairy vetch. Cereal rye grown without legume (in monoculture) contained 11.2 and 11.1 (two years of data) kgN/ha when grown with low residual soil N (prior corn fertilized using 150 kgN/ha). The corresponding values for cereal rye grown with crimson clover were 12.3 and 12.3 and with hairy vetch, 19.9 ad 15.3 kgN/ha. With high residual N (300 kgN/ha) applied to preceding corn crop), results were qualitatively similar, with statistically significant differences obtained in 1993 as follows: rye (11.3 kgN/ha) < rye (with crimson clover-18.2 kgN/ha) < rye (with hairy vetch-26.5 kgN/ha). These results occurred while the corresponding figures for cereal rye biomass in Mg/ha were 5.73 > 3.26 > 2.27. Cereal

rye monocultures reduced residual soil N by 62 and 37% in 1993 and 1994. Bicultures with cereal rye and legumes reduced residual soil N by 44 and 15% for the same years. Taken together, these values strongly suggest transfer of N from legumes to associated cereal rye, because the cereal rye was sown at lower densities and attained equal or lower biomass in biculture, yet accumulated higher total N than in cereal rye monocultures.

Biomass

Due to cold dormancy, hairy vetch is not suitable for early incorporation. If allowed to grow until May, it will frequently outyield other varieties (Madson, 1951). Dry matter yields (Mg/ha) obtained in individual studies with hairy vetch were given as: 4.2, 3.8, 4.2, 2.7, 2.7 (Smith et al., 1987.). Dry matter yield was measured by Hargrove (1982) as 2.4 tons/acre (5.38 Mg/ha) but may range as high as 6.00-7.00 Mg/ha, with the mean dry wt. of three-year field trial in Georgia being 4.25 Mg/ha. (Hargrove, 1986).

Hofstetter (1988) reported that biomass ranges from 2,000 lb/acre dry matter 60 days after breaking dormancy to 5,000 lb/acre dry matter 90 days after breaking dormancy and that, after overseeding into soybeans, dry matter yield was 1,464 lb/acre.

N Contribution

Above-ground nitrogen contents (kg/ha) obtained in individual studies were given by Smith et al. (1987) as: 133, 132, 209, 153. Proportion of nitrogen estimated obtained from fixation were given as: 0.79, 0.84, 0.83, 0.75. Estimated N fertilizer equivalences under no-tillage regimes were given (kg/ha) as: followed by cotton - 67-101; followed by corn - 78, 100, 200, 200; followed by sorghum - 89 or less, 50 - 128. Above-ground nitrogen content (kg/ha) obtained in mixture with rye was 158. Proportion of nitrogen estimated obtained from fixation were given as: 0.71. Proportion of nitrogen accumlated in roots was given as: 0.09.

Hairy vetch above-ground N content has been estimated as: (1) N content 4%, with total N content of 80-200 lb/acre (Hofstetter, 1988); (2) up to 100 lb/acre (McLeod, 1982); (3) N content 4%, with total N content 57 lb/acre when overseeded into soybean (Hofstetter, 1988); (4) mean N content of three year field trials in Georgia were 134 kg/ha and 153 kg/ha (Hargrove, 1986); (5) McVay et al. (1989) stated that hairy vetch replaced 123 kg/ha of N in corn and sorghum production in Georgia; above-ground N-content of hairy vetch was 128 kg/ha.

Hargrove (1982) reported studies with no-till corn showing that, with no nitrogen fertilizer applied, there was about twice as much available soil nitrogen in early June following hairy vetch than following cereal rye as the winter cover crop. Corn grown with hairy vetch mulch had higher tissue nitrogen content and showed much less nitrogen stress than corn grown in rye mulch. Yields of corn were almost as high in hairy vetch plots where 88 lbs N/a was added. Hairy vetch provided an average of about 80 to 90 lbs N/a per year during the 5-year study period. Dry Matter Yields and N Content were estimated as 2.4 tons/acre (5.38 Mg/ha) at 4.8% N = 230 lb./acre total nitrogen.

In Georgia, hairy vetch managed with minimum tillage provided almost all the N required for corn and grain sorghum and gave higher yields than did conventional tillage (green manure) (Hargrove, 1982).

Frye and Blevins (1989) recounted a study in which corn (*Zea mays*) was grown following cover crops of hairy vetch (*Vicia villosa*), bigflower vetch (*Vicia grandiflora*), crimson clover (*Trifolium incarnatum*), and rye (*Secale cereale*); control plots used corn residue. From 1977 through 1983, nitrogen was applied at 0, 50, and 100 kg/ha; from 1984 through 1985, the nitrogen rates were 0, 85, and 170 kg/ha. No-till was used throughout the study from 1977 through 1983. Thereafter, split plot assignment was to no-till and conventional tillage. Under the no-till regime, hairy vetch gave significantly higher yields than any of the other levels of cover crop. Under hairy vetch + 100 kg/ha of N per year, corn yields increased at an annual rate of 500 kg/ha from 1977 to 1981; the corresponding yields with rye and control plots remained the same or declined slightly during that period. No-till hairy vetch showed significantly-higher soil organic matter than either rye or fallow. Hairy vetch provided yield improvements above those attained with nitrogen addition alone, and it appears to be an economically-feasible cover crop for use in rotation with corn in Kentucky.

McCracken et al. (1989) reported a study in which first-year residual effects of nitrogen fertilization and cover crops of hairy vetch and rye were observed in corn. Control plots used corn stover alone. One year after discontinuing the practice, the residual effect of N-fertilization was to increase N uptake by corn by 20.4 kg/ha over that seen with corn residue alone. With hairy vetch, uptake by corn was higher by 28.0 kg/ha. Holdover effects of rye cover cropping were small and inconsistent.

Power et al. (1991) conducted a four-year field study in Nebraska in which hairy vetch tilled under supplied N equivalent to or greater than 55 lb of fertilizer N per acre. Hairy vetch managed without tillage contributed very little N, even after several years. Much of the N may have been lost by volatilization. Contrasting results from the southeastern United States suggest that under warmer, more humid conditions, N mineralization from surface residues does provide substantial N to succeeding corn.

Ranells and Wagger (1996) found that, based on linear correlation coefficients, initial C:N ratio was a consistently significant predictor of N release by cover crop residues (cereal rye, crimson clover, hairy vetch, and bicultures of cereal rye/crimson clover and cereal rye/hairy vetch). By contrast, Lignin:Nitrogen ratio was not a reliable predictor of N release, although this has been the case in prior studies.

In a replicated field study, Ranells and Wagger (1997a) explored N-recovery by cereal rye and crimson clover monocultures, bicultures of these two plants, and a weedy fallow on the coastal plain of North Carolina. 15N-labelled potassium nitrate fertilizer was applied to microplots 1 week after sowing cover crops (sowing in early October) in a Norfolk loamy sand. Rooting depth was 25 cm in December, 70 cm in March, and 90 cm in April. Percent recovery of fertilizer N by various cover crop regimes was as follows:

Cover Crop	% Fertilizer Recovered (1993, 1994)
Crimson Clover	4, 3
Cereal Rye	35, 42
Crimson Clover/Cereal Rye	13, 24
Resident Weeds	1,0
(mainly henbit [*Lamium amplexicaule* and chickweed [*stellaria media*])	

Significance tests (Fisher's plsd) indicated the following ranking for efficiency of fertilizer N recovery: cereal rye > cereal rye/crimson clover > crimson clover = resident winter-annual weeds.

Ranells and Wagger (1996) conducted field trials on the North Carolina coastal plain concerning monocultures of crimson clover, hairy vetch, and cereal rye, and bicultures of crimson clover/cereal rye and hairy vetch/cereal rye managed without tillage. The greatest N-content occurred with hairy vetch monocultures (154 kg N/ha) and the least with cereal rye (41 kg N/ha). The rates of N-release were in this order: hairy vetch > crimson clover = hairy vetch/cereal rye > crimson clover/cereal rye = cereal rye. For cereal rye grown in monoculture, the C:N ratio was 40:1, whereas when cereal rye was grown in biculture with hairy vetch, the C:N ratio was 28:1. Thus, cereal rye grown with hairy vetch has less likelihood of immobilizing N during decomposition. Mean values obtained for this two-year study were as follows:

Cover Crop	C:N	N Content (kgN/ha)
Cereal Rye	38, 42	17, 64
Crimson Clover	17, 17	35, 134
Hairy Vetch	11, 11	125, 182
Cereal Rye/Crimson Clover	24, 28	42, 111
Cereal Rye/Hairy Vetch	14, 21	82, 200

In this tillage experiment, growth stages were as follows, on April 19 or 20.

Cover Crop	Growth Size at Biomass Harvest
Cereal Rye	Heading
Crimson Clover	Mid-Bloom
Hairy Vetch	Early Bloom

In the warm, rainy first year of the study, 90% of the N in the hairy vetch monoculture had been released by the 8th week of the study; 71% of the N had been released for the cereal rye monoculture.

Ranells and Wagger (1997b) conducted a replicated field trial on N-dynamics of the following monocultural and bicultural cover crops: (1) cereal rye; (2) crimson clover; (3) hairy vetch; (4) cereal rye/crimson clover; and (5) cereal rye/hairy vetch. Cereal rye grown without legume (in monoculture) contained 11.2 and 11.1 (two years of data) kgN/ha when grown with low residual soil N (prior corn fertilized using 150 kgN/ha). The corresponding values for cereal rye grown with crimson clover were 12.3 and 12.3 and with hairy vetch, 19.9 ad 15.3 kgN/ha. With high residual N (300 kgN/ha) applied to preceding corn crop), results were qualitatively similar, with statistically significant differences obtained in 1993 as follows: rye (11.3 kgN/ha) < rye (with crimson clover-18.2 kgN/ha) < rye (with hairy vetch-26.5 kgN/ha). These results occurred while the corresponding figures for cereal rye biomass in Mg/ha were 5.73 > 3.26 > 2.27. Cereal rye monocultures reduced residual soil N by 62 and 37% in 1993 and 1994. Bicultures with cereal rye and legumes reduced residual soil N by 44 and 15% for the same years. Taken together, these values strongly suggest transfer of N from legumes to associated cereal rye, because the cereal rye was sown at lower densities and attained equal or lower biomass in biculture, yet accumulated higher total N than in cereal rye monocultures.

During a two-year replicated study on a Maury silt loam soil in Mississippi, Varco et al. (1993) compared disappearance of hairy vetch residue, loss of N from the residue, and recovery of soil N for soil cores managed with versus without tillage. After 30 days in the field without tillage, vetch residue had lost 45% of its dry mass and 60% of its N. Corresponding figures with tillage (incorporation of vetch residue into the soil) were 77% of dry mass and 89% of N. Use of N-15 labeled vetch and ammonium nitrate fertilizer enabled a comparison of inorganic N availability using a cover crop vs. a synthetic N source. Fifteen days after application, recovery of inorganic N-15 from vetch was 47% under conventional tillage and 12% without tillage. Corresponding figures for labeled ammonium nitrate were 78% with conventional tillage and 57% without tillage. These results point up delays in nitrogen availability from vetch because decomposition of residues must occur, and thereafter immobilization of N in organic forms may ensue.

Non-N Nutrient Contribution

Hairy vetch is said to facilitate the availability of potassium to other, shallower-rooted, crops (check with Liebhardt on reference).

Ranells and Wagger (1996) cited Van Soest (1964) as a reference for the statement that lignia linkages in non-leguminous plants are usually more resistant to decomposition than those of legumes. Ranells and Wagger observed that, based on field trials in North Carolina, lignia concentrations were significantly greater for hairy vetch (84g/kg) than for cereal rye (27g/kg) or crimson clover (46g/kg) (Least Sig. Difference=11).

Effects on Water

Zachariassen and Power (1991) reported that crimson clover showed a consistently-higher water use efficiency (g of dry matter produced per liter of water evapotranspired) than hairy vetch at 10, 20, and 30C. Sweet clover showed intermediate values.

Effects on Microclimate

No information is available in this database on this topic.

Effects on Soil

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On a sandy soil on the coastal plain of Georgia, cover crops led to a higher percentage by weight of water-stable aggregates (>250 microns in diameter), and hairy vetch plots showed better water infiltration than did fallow or wheat plots (McVay et al., 1989).

Wagger and Denton (1989) reported a three-year field study conducted on a fine sandy loam soil. Corn was grown in no-till plots following cover crops of hairy vetch (*Vicia villosa*) or wheat (*Triticum aestivum*) and in control plots with no cover crops. Spacing of rows of cover crops was not specified. Cover-cropped plots showed no increases in total porosity, macroporosity, or hydraulic conductivity over control plots. There was also no decrease in bulk density in cover-cropped plots. Vehicular traffic, on the other hand, led to severe compaction of the soil.

Ranells and Wagger (1997b) conducted a replicated field trial on N-dynamics of the following monocultural and bicultural cover crops: (1) cereal rye; (2) crimson clover; (3) hairy vetch; (4) cereal rye/crimson clover; and (5) cereal rye/hairy vetch. Cereal rye grown without legume (in monoculture) contained 11.2 and 11.1 (two years of data) kgN/ha when grown with low residual soil N (prior corn fertilized using 150 kgN/ha). The corresponding values for cereal rye grown with crimson clover were 12.3 and 12.3 and with hairy vetch, 19.9 ad 15.3 kgN/ha. With high residual N (300 kgN/ha) applied to preceding corn crop), results were qualitatively similar, with statistically significant differences obtained in 1993 as follows: rye (11.3 kgN/ha) < rye (with crimson clover-18.2 kgN/ha) < rye (with hairy vetch-26.5 kgN/ha). These results occurred while the corresponding figures for cereal rye biomass in Mg/ha were 5.73 > 3.26 > 2.27. Cereal rye monocultures reduced residual soil N by 62 and 37% in 1993 and 1994. Bicultures with cereal rye and legumes reduced residual soil N by 44 and 15% for the same years. Taken together, these values strongly suggest transfer of N from legumes to associated cereal rye, because the cereal rye was sown at lower densities and attained equal or lower biomass in biculture, yet accumulated higher total N than in cereal rye monocultures.

In Milan, Tennessee, Mullen et al. (1998) compared no-till corn production with winter cover crops of hairy vetch or wheat or no cover crop, with and without the addition of synthetic fertilizer N (168 kg/ha). Cover cropping with hairy vetch led to the highest levels of soil carbon, heterotrophic soil bacteria, and four enzymes: acid phosphatase, aryl sulfatase, beta-glucosidase, and L-asparaginase.

Effects on Livestock

Although hairy vetch is said to make good silage or pasture (Duke, 1981), there have been reports of toxic effects on cattle fed high proportions of hairy vetch (Bugg, pers. comm.). For example, Odriozola et al. (1991) reported that in Argentina, grazing a herd of 33 Aberdeen Angus bulls for 20 days in a pasture composed mainly of hairy vetch led to 8 of the animals developing conjunctivitis, rinitis, dermatitis, fever, and loss of hair. Death of all 8 animals occurred within 15 days after development of the symptoms. No more animals became sick after five days had elapsed following removal of the herd from the pasture. The toxin responsible remains unknown: other vetches contain cyanogenic glycosides, but the syndrome observed here does not correspond to these toxins. Some have ascribed the toxicity to aphids associated with the hairy vetch.

Duke (1981) recounted that the seed of *Vicia villosa*, though less toxic than those of *Vicia sativa*, are poisonous to cattle, causing pain, bellowing, sexual excitement, and convulsions.

Effects on Workers

No information is available in this database on this topic.

Pest Effects, Insects

House and Alzugaray (1989) reported that hairy vetch (*Vicia villosa* Roth) sustained a higher densities of above-ground arthropods and a more taxonomically-diverse entomofauna than did crimson clover (*Trifolium incarnatum* L.) or wheat (*Triticum aestivum* L.). Soil arthropods were more diverse under no-tillage than under tillage. Pest and beneficial soil arthropods were most abundant in no-tillage corn preceded by hairy vetch. Differences that were apparent early had dissipated by midseason.

As recounted by Bugg et al. (1991), hairy vetch sustains aphids (pea aphid, *Acyrthosiphon pisum*; blue alfalfa aphid, *Acyrthosiphon kondoi*) that do not attack pecans, along with associated predators (e.g., various lady beetles) that can disperse to pecan trees and attack pecan aphids. Hairy vetch is being used as an understory cover crop by some pecan growers in efforts to enhance early-season biological control of pecan aphids.

Bugg et al. (1990) reported a replicated trial conducted in southern Georgia that concerned 20 cool-season cover-cropping regimes and associated insects. Sampling was conducted from February to early June. Convergent lady beetle (*Hippodamia convergens* Guerin-Meneville) and seven-spotted lady beetle (*Coccinella septempunctata* [L.]) occurred on a seasonal sequence of plants. These lady beetles first were found in substantial numbers on rye (February 2 and 9), then on crimson clover and lentil Feb. 16 - March 30), later on subterranean clover (March 7-30), still later on narrow-leafed lupin (April 10 - June 6), then hairy vetch (which harbored blue alfalfa aphid [*Acyrthosiphon kondoi* Shinji] and pea aphid [*Acyrthosiphon pisum* {Harris}]) (March 28 - June 6), and lastly on mustard and collard (April 10 - June 6). Bigeyed bugs, mainly *Geocoris punctipes* (Say), were abundant from late March through late April on 'Vantage' vetch, lentil, and in monocultures of hairy vetch and crimson clover. Berseem and arrowleaf clovers and hairy vetch/ryegrass remained green later than did many other crops and exhibited exceptionally-high densities of bigeyed bugs on June 2nd. Insidious flower bug (*Orius insidiosus* [Say]), an important predatory insect that attacks numerous agricultural pests, was abundant on several dates on narrow-leafed lupin, hairy vetch (in monoculture and in biculture with annual ryegrass), and lentil. *Lygus* spp., which are important pests of field, row, and orchard crops, were exceptionally abundant on 'Cahaba White' and 'Vantage' vetches; both feature stipular extrafloral nectaries at which *Lygus* frequently fed. *Lygus* were also abundant on hairy vetch (monoculture and biculture) and, to a lesser extent, on turnip and monocultural crimson clover but were notably scarce on subterranean clover.

In coastal Massachusetts, Bugg and Ellis (1990) found that shake samples and whole-plot visual inspections indicated, respectively, that faba bean sustained relatively high densities of bean aphid, *Aphis fabae* Scopoli (Homoptera: Aphididae), and associated lady beetles (Coleoptera: Coccinellidae) during late June. By contrast, sorghum featured high densities of corn leaf aphid, *Rhopalosiphum maidis* (Fitch), and lady beetles during the first three weeks of July. Hairy vetch/rye harbored particularly high densities of aphids (pea aphid, *Acyrthosiphon pisum* [Harris], on hairy vetch; corn leaf aphid and English grain aphid, *Sitobion avenae* (Fabricius), on rye) on July 8th and 23rd, and exhibited consistently-high densities of aphids and aphidophaga, including Syrphidae (Diptera). Sweetclover aphid, *Therioaphis riehmi* (Boerner), was at times abundant on annual white sweetclover but did not attract many aphidophaga. Shake samples showed that hairy vetch and buckwheat harbored relatively-high densities of insidious flower bug, *Orius insidiosus* (Say) (Hemiptera: Anthocoridae), and tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois) (Hemiptera: Miridae). Shake sampling also indicated relatively high densities of saccharophilous ants on faba bean and on buckwheat. Whole-plot inspection showed that relatively high densities of nectarivorous predatory wasps (Hymenoptera: Vespidae and Sphecidae) were attracted to the flowers of buckwheat (18 taxa of wasps observed) and annual white sweetclover (11 taxa).

Hairy vetch lacks the extrafloral (stipular) nectaries possessed by several of its congeners. Hairy vetch also sustained relatively high densities of insidious flower bug (*Orius insidiosus* [Say]), which probably fed on the abundant thrips (Thysanoptera) that infested foliage and flowers (Bugg and Ellis, 1990).

Bugg and Ellis (1990) reported that in coastal Massachusetts, both buckwheat and hairy vetch harbored relatively high densities of tarnished plant bug. This insect probably causes negligible damage to the cover crops themselves, but readily disperses from crops rendered unsuitable. As a pest of orchards, it can be exacerbated by cover crops or flowering understory vegetation.

Bugg and Ellis (1990) reported that cultural practices can have implications for arthropods. Timing of practices may be important. For example, when used as green manure, buckwheat is typically ploughed down after 7 to ten days of flowering. By contrast, in Massachusetts, insidious flower bug requires about 20 days to produce a new generation. Mowing or ploughing while most bugs are in the non-dispersive nymphal stages would probably destroy most of them. On the other hand, hairy vetch takes longer to mature, and might produce more generations of insidious flower bug. However, it typically must be chopped prior to being incorporated as green manure. This would probably kill a large proportion of the associated insidious flower bug and seven-spotted lady beetle. Mowing reduces the ability of Fabaceae to support beneficial arthropods and prompts dispersal by *Lygus* spp., Anthocoridae, and other insects. No-tillage approaches may conserve beneficial insects better than does conventional tillage. Many of the predatory wasps observed in the present study represent ground-nesting species, and tillage would probably interfere with ongoing reproduction. On the other hand, digger wasps often nest in disturbed areas, and tillage may also make available new potential nesting sites. If insectary functions are desired, management of cover crops may require some modification. Use of sickle-bar mowers appears a gentler alternative to flail mowing but is not always feasible. Timing of mowing or tillage may be adjusted to allow maturation or dispersal of beneficial insects. Remnant strips of cover crops could provide habitat to beneficial insects, and arrest movement by dispersive pests, such as *Lygus* spp.

Flexner et al. (1991) reported that in southern Oregonian pear orchards, certain understory weeds can harbor high densities of twospotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae). This mite is mainly a secondary pest and a creature of

pesticide-disrupted or stressed agroecosystems. Among the plant species suitable for use as cover crops, vetch appeared particularly prone to outbreaks of the mite. Use of herbicides led to increased movement by mites into trees.

House (1989) reported a replicated trial in which corn was grown following no-till or conventionally-tilled winter cover crops of hairy vetch, crimson clover, or wheat. Hairy vetch harbored a more abundant and diverse below- ground arthropod fauna (herbivores and predators) than did crimson clover or wheat. Elateridae, Curculionidae, and Carabidae were particularly abundant following no-till hairy vetch. Scarabaeidae were especially abundant following conventionally-tilled clover. Elateridae (wireworms) were the dominant herbivores in no-till systems. Observed faunal differences had dissipated by July.

Bugg et al. (1991) reported that in mature pecan orchards under minimal or commercial management, cool-season understory cover crops of hairy vetch, *Vicia villosa* Roth, and rye, *Secale cereale* (L.), sustained significantly higher densities of aphidophagous lady beetles than did unmown resident vegetation or mowed grasses and weeds. In cover-cropped understories, mean densities of aphidophagous coccinellids were nearly 6 X greater than in unmown resident vegetation and approximately 87 X greater than in mown grasses and weeds. During late winter and spring, rye harbored abundant bird cherry - oat aphid, *Rhopalosiphum padi* L., whereas hairy vetch sustained pea aphid, *Acyrthosiphon pisum* (Harris); blue alfalfa aphid, *A. kondoi* Shinji; and thrips, *Frankliniella* spp. The following aphidophagous lady beetles were adundant in cover-cropped understories: (1) convergent lady beetle, *Hippodamia convergens* Guerin- Meneville; (2) *Olla v-nigrum* (Mulsant); and (3) seven-spotted lady beetle, *Coccinella septempunctata* L. In the orchard under minimal management, the rye/vetch mixture led to enhanced densities of convergent lady beetle in the pecan trees. However, no other effects on coccinellids were seen. There was no evidence of improved biological control of pecan aphids. In the minimal-management orchard, lady beetles occurred on rye in substantial densities from early April through early May. By contrast, attendance on hairy vetch extended from early April until early June for *H. convergens* and *C. septempunctata*. By early May, *O. v-nigrum* had had almost entirely left the understory and entered the pecan canopy. From mid April through early May, *O. v-nigrum* was mainly associated with pecan catkins, which contained abundant thrips (mainly *Frankliniella tritici* [Fitch] and *F. bispinosa* [Morgan]). In the commercial orchard, convergent lady beetle occurred predominantly on rye from early April through early May, and thereafter was found mostly on hairy vetch. *Olla v-nigrum* relied almost exclusively on rye through early May, by which time many of the beetles had dispersed to the pecan catkins, as in the minimal-management orchard. Seven-spotted lady beetle relied substantially on rye from late April until mid May, and from early through late May on hairy vetch. Coccinellid larvae appeared to concentrate almost exclusively on the bird cherry - oat aphid on rye, from early May through early June.

Bugg et al. (1991) reported that *Olla v-nigrum* and convergent lady beetle feed on thrips in lieu of aphids. However, in this case the principally-arboreal *O. v-nigrum* apparently dispersed from an understory cover crop with abundant aphids to pecan trees, which at the time harbored numerous thrips but few aphids. This pattern contrasted with that reported by Bugg et al. (1990), who showed that narrow-leafed lupin and various brassicaceous cover crops grown in the open (away from trees) harbored abundant thrips and sustained high densities of *O. v-nigrum* from early April through late May. The present data suggest that for *O. v-nigrum*, such sources of thrips in the understory may prove superfluous, at least while pecan is in flower, from mid April through mid May.

Pest Effects, Nematodes

According to Duke (1981), *Vicia villosa* is recorded as hosting 30 species of plant-parasitic nematodes, including *Belonolaimus* spp., *Criconemoides* spp., *Ditylenchus dipsaci Heterodera* spp., *Hoplolaimus galeatus*, *Meloidogyne hapla*, *M. incognita acrita*, *M. javanica*, *Paratylenchus* spp., *Pratylenchus* spp., *Rotylenchulus* spp., *Scutellonema brachyurum*, *Trichodorus christiei*, *Tylenchorhynchus claytoni*, and *Xiphinema americanum*.

Nematologists in the southeastern U.S. use hairy vetch to build up *Meloidogyne arenaria* (McKenry, pers. comm.).

Ball and Gray (1980) stated that hairy vetch is susceptible to root-knot nematodes (*Meloidogyne spp.*) and that its use can result in buildup of these pest and yield losses to following susceptible summer row crops.

McSorley and Dickson (1989) grew cereal rye (*Secale cereale*) and hairy vetch (*Vicia villosa*) as cool-season cover crops in monocultural plots on a sandy soil in Florida, to determine effects on nematode population densities over two years. In early April of each year, cover crops were mowed and disced and then planted to soybean (*Glycine max* [L.] Merr.). Plant- parasitic nematodes assessed included *Belonolaimus longicaudatus* Rau, *Meloidogyne ingognita* (Kofoid and White) Chitwood, *Pratylenchus brachyurus* (Godfrey) Filipjev & Schuurmans Stekhoven, *Criconemella sphaerocephala* (Taylor) Luc & Raski, *Paratrichodorus minor* (Colbran) Siddiqi, and a *Xiphinema* sp. (possibly *X. floridae* Lamberti & Bleve-Zacheo). The design of the experiment did not permit comparison of rye to hairy vetch. In most instances, cover cropping for 3 or 5 months resulted in maintenance of, or slight decline from, pre-existing nematode densities. Growth of rye resulted in increased densities of *B. longicaudatus*.

In Florida, Gallaher et al. (1988) tested hairy vetch and four vetch cultivars derived from hybridization with common vetch ('Vantage', 'Cahaba White', 'Vanguard', and 'Nova II') using tillage and no-till regimes preceding corn or sorghum. The soil type was sandy loam. Densities of *Meloidogyne incognita* were much higher on hairy vetch than on any of the vetches derived from common vetch. *Criconemella ornata* attained relatively-high densities on 'Vantage', 'Cahaba White', and 'Vanguard'. *Pratylenchus brachyurus* and *Paratrichodorus minor* attained statistically-similar densities on all five vetches. *Paratrichodorus minor*. Root gall index was highest for hairy vetch. Numbers of *Pratylenchus brachyurus* per 10 g of roots were particularly high for 'Cahaba White', and 'Vanguard'. Tillage regime had little effect on nematode densities, but ring nematode did occur at significantly-higher densities under no-till management.

Guertal et al. (1998) reported on replicated greenhouse pot and field studies in Alabama on the effects of winter-annual cover crops on southern root-knot nematode (*Meloidogyne arenaria*) and reniform nematode (*Rotylenchulus reniformis*), two plant-parasitic species. In the greenhouse pot trial using fine sandy loam soil, hairy vetch showed an increase of reniform nematode density (population index = 1.43 [final nematode density divided by initial nematode density]), common vetch (cv 'Cahaba White') maintained the existing reniform nematode densities (population index = 0.99), and reniform nematode densities were decreased both for cereal rye (population index = 0.37) and no cover crop (control) (population index = 0.08). Final reniform nematode densities for hairy vetch were not significantly different from those for common vetch; both of these, however, differed significantly for final densities for cereal rye and control. The latter two treatments did not differ from one another.

In a field study on fine sandy loam soil in southeastern Alabama, Guertal et al. (1998) reported that densities of southern root-knot nematode (*Meloidogyne arenaria*) on okra were significantly increased by preceding winter cover crops of common vetch, hairy vetch, or crimson clover, by comparison with plots lacking cover crops.

Guertal et al. (1998) concluded that the vetches tested are maintenance hosts for reniform nematode (*Rotylenchulus reniformis*) and should not be grown prior to susceptible cash crops, such as cotton. Cereal rye or bare fallow would be a better choices based on this criterion.

Pest Effects, Diseases

No information is available in this database on this topic.

Pest Effects, Weeds

Schenk and Werner (1991) reported that various legumes in the tribe Vicieae (peas, lentils, and vetches) contain Beta-(3-isoxazolinonyl) alanine, which is released into soil as a root exudate and, apparently, is an allelopathic compound. Schenk and Werner (1991) reported that this chemical can reduce growth in seedlings of various grasses and of lettuce, but that pea was only slightly affected.

Pest Effects, Vertebrates

Duke (1981) recounted that the seed of *Vicia villosa*, though less toxic than those of *Vicia sativa*, are poisonous to cattle, causing pain, bellowing, sexual excitement, and convulsions.

All vetches seem to provide habitat (cover) for small mammals such as rabbits and mice. (Mark Van Horn, pers. comm.)

To top of Hairy Vetch

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- Cover Crop Resource Page

Search:
- Cover Crop Database

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