Annual Winter Legumes

By
E. N. Fergus
Lawrence Henson
B. W. Fortenbery

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Crimson Clover, Hairy Vetch, Hop Clover, Button Clover and Bur Clover

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Winter legumes are annual plants of the legume family that complete their development during the fall, winter, and spring. Though they sometimes make considerable growth during the fall, they rarely do more than become well established and make a good ground cover. During late winter, as the weather becomes favorable for growth, they begin rapid development that is completed by late spring or early summer.

Members of this group of legumes known to be of agricultural value in Kentucky are crimson clover (*Trifolium incarnatum*), low hop clover (*Trifolium procumbens*), and hairy or winter vetch (*Vicia villosa*). Members of this group which may have agricultural possibilities in Kentucky are black medic (*Medicago lupulina*), least hop clover (*Trifolium dubium*), bur clovers (*Medicago sp.*), and button clover (*Medicago orbicularis*).

Cultural Practices and Uses

In general, soil treatment and cultural practices are similar for the production of each of these crops.

Soil treatment

While these legumes as a group are not exacting in their soil requirements they respond profitably to soil treatments generally throughout Kentucky. If the land has not been limed in the last 8 to 10 years, about 2 tons of ground limestone should be applied per acre and worked into the soil a few weeks before seeding. Applications of phosphate and potash to the soil will be profitable except where these elements are present in adequate amounts in

the available forms. Quick soil tests will be helpful in deciding the actual amount to apply. Most counties have laboratories that make these tests under the supervision of the county agricultural agent.

Preparation of seedbed

A good seedbed should be prepared for these legumes except for seedings in sods. The specially prepared seedbed should be firm but have a loose surface. Sods should be disked enough to provide a cover for the seeds. Heavy sods should be grazed first, or clipped and the material on top of the ground removed, else the seedlings will be smothered.

Method of seeding

The seed may be sown in any way that results in an even distribution and proper covering of the seed. A good job may be done by broadcasting with a hand seeder and covering with a cultipacker or harrow. However, the cultipacker seeder, or small seed drill or other satisfactory seeding implement, is recommended. Perhaps all seed sown broadcast with hand seeders should be divided, half being sown in one direction and half in the other.

Crimson clover, winter vetch, and button clover, though sown alone with excellent results, should generally be seeded with a small grain or perhaps Italian ryegrass. Other winter legumes in Kentucky should be sown in a sod, or with a perennial grass. These various small-grain-legume or grass-legume mixtures control erosion better than the legume alone, and they undoubtedly are more winter-hardy, especially if seeded late. Nitrogen fixed by the legume is more largely conserved if a small grain or grass is grown with the legume. The mixture produces a better pasture than either crop by itself. It appears, therefore, that winter legumes should seldom be sown alone.

Bur clover in the hull is best sown broadcast and disked or harrowed into the soil. The smaller-seeded species need not be harrowed in unless the seedbed is very fine. If the soil is dry, run a cultipacker over the field before and after sowing. Winter vetch should be covered to a depth of 2 inches; therefore it should be

sown in a specially prepared seedbed, with a grain drill, if possible, rather than broadcast and disked or harrowed in. If it is to be sown with a small grain or Italian ryegrass, the seeds may be mixed and sown at the same time. If drilled separately, the vetch seed should be sown ahead of the small grain. Crimson clover, when sown with small grain or ryegrass, may be sown through the grass-seed attachment of the grain drill at the time the grain or ryegrass is sown, or sown broadcast afterwards. Crimson clover and other small seed should be covered with not more than ½ inch of soil.

Rates of seeding

Seeding rates vary widely. Vetch is sown at heavier rates than smaller seeded legumes. It seems desirable to sow the small seeded kinds at rates considerably in excess of what would be expected to produce a heavy stand. Recommended acre rates of seeding for the various winter legumes in Kentucky are as follows:

	Seeded alone or in sod	*Seeded with small grain or Italian ryegrass*
Crimson clover (threshed seed)	12-18 lb	8-10 lb
Hop clover	3- 5 lb	
Vetch	20-60 lb[1]	15-25 lb
Black medic	10-20 lb	
Bur clover[2]	30-60 lb	20-25 lb
Button clover	10-20 lb	8-12 lb

[1] See p. 15. [2] Unhulled.

Small grains with which the legumes are seeded should be sown at 4 to 6 pecks to the acre. The lighter rates are preferred for early seeding; the heavier for late seeding. Ten to 15 pounds of Italian ryegrass seed to the acre are sufficient for the ryegrass-winter-legume mixture.

Winter legumes may be seeded from about August 5 to October 15. The best date varies with sections of the state and with the legume. Generally speaking, seeding dates in southern and western Kentucky are about 10 days later than in northern and eastern Kentucky. Because winter vetch, hop clover, and black medic are quite winter hardy, they may be sown late, though early sowing ensures more growth before winter. Crimson clover is slightly less winter hardy; therefore it ought to be sown early.

Bur clover and button clover are perhaps somewhat less winter-hardy than crimson clover. Preferred dates for seeding the winter legumes under various conditions in different parts of Kentucky are shown in the table on page 18.

Inoculation

All winter legume seed should be inoculated immediately before seeding to assure inoculation with an effective nodule organism. The manufacturer's directions should be carefully followed.

Uses

Winter legumes as a group are of value in Kentucky principally for soil improvement and conservation, and for winter and spring pasture.

Some of these crops may undoubtedly be harvested profitably for seed and a few may be made into hay, but the weather is frequently so unfavorable for hay making at the time they should be harvested that they are better used otherwise.

If used wholly as green-manure crops, they should be plowed under while still green and in any event at least two weeks before the next crop is seeded.

Insect pests and diseases

Insects seldom seriously injure any of the winter legumes. Crown rot often damages crimson clover and vetch and some damage may be done to most of them by organisms that cause stems to become black and, when severe, to drop their leaves.

Crimson Clover

Crimson clover is an erect, pubescent, many-stemmed plant that is especially distinguished from the other legumes by its long, numerous, compact heads of crimson flowers.

This clover possesses several good qualities that make it, in Kentucky, the most generally useful of the winter legumes. The cost of seeding an acre is usually among the lowest of the crops, and the seed is easily sown. It stands pasturing well; is adapted to medium productive soil as well as to the best soil; is palatable, nutritious, and quite productive of pasture and seed. The crop, however, has some objectionable qualities that have prevented its

Crimson clover is a good cover, pasture, and green-manure crop

more general use in Kentucky. Perhaps the most serious of these is the rather frequent loss of stands in the seedling stage. This happens because the seed germinates quickly; consequently, seedings made on a dry soil germinate with the first shower that wets the surface, only to perish because of insufficient moisture in the subsurface. Sowing at heavy rates—25 to 30 pounds per acre—appears to produce more successful stands than the lighter rates commonly used. Stands from late seedings are likely to die during the winter unless the winter is mild and not conducive to heaving. If, however, the late seeding is made in a sod, or with a small grain or with Italian ryegrass, the stands seem to be sufficiently protected by the companion crop to survive rather severe winters.

Crimson clover makes sufficiently good growth in Kentucky on soil of medium productivity to justify its use even when it is impossible to apply lime and fertilizer. However, the crop responds so favorably to the soil treatments suggested on page 3 that it is worthwhile to go to considerable expense to make them.

Use

Crimson clover is valuable primarily for soil improvement and pasture. Usually a stand serves both purposes. For pasture it is especially prized because of its rapid growth, excellent palatability, and high nutritive value. It is likely to cause bloating of cattle and sheep, especially if they are turned on it when hungry and without salt and water readily at hand.

Crimson clover makes good hay when it is cut in early bloom

Small grain and crimson clover grow well together, protect the soil, and make excellent pasture

and is well cured. However, it is seldom possible to make good hay of crimson clover unless it is cured artificially. Weather in Kentucky is seldom good for making hay at the time crimson clover hay should be made. If crimson clover hay is to be fed to horses or mules it must be cut before any heads become brown; otherwise "hair balls," formed in the intestines from certain parts of these mature flowers, may kill the animals.

Some crimson clover is harvested for seed in Kentucky. It is not difficult to harvest, though careful handling of the crop is required to prevent shattering of the seed. The crop should be cut with a field mower a few days after the last heads become brownish. Unless the crop is lodged, it is desirable to cut high in order to reduce the amount of material that has to be handled.

A mixture of Italian ryegrass and crimson clover prevents erosion and makes good grazing

To avoid excessive shattering of the seed, mowing should be done while dew is on the plants, and the material as cut should be bunched or windrowed by special attachments on the cutter bar of the mowing machine. In taking the crop to the huller or to storage to await hulling, it should be handled little and carefully, and hauled on a wagon with a tight bottom.

The seed may be hulled satisfactorily with the small combine harvester, a clover-seed huller, or grain-threshing machine equipped with special hulling concaves and screens.

Disease

Crimson clover is frequently injured somewhat, and occasionally seriously, by crown or stem rot (*Sclerotinia trifoliorum*). The disease kills plants during mild winter weather and during the spring. Crowns of the dead plants may be lifted readily from the taproot, and more or less spherical, but irregularly shaped white to black masses, may be found in and about many of the dead crowns and taproots. These bodies are conclusive evidence of the disease. There is no practical remedy for it, nor can it be prevented by any known method. Fortunately, the disease rarely destroys the entire stand, and only infrequently reduces it seri-

Harvesting crimson clover seed

ously. Even when the disease is quite prevalent in a field, enough plants usually survive to produce a good crop.

Varieties

Dixie and other hardseeded varieties are known as reseeding crimson clover. These are less productive of herbage in Kentucky than most lots of commercial seed, especially those that originate in Western Kentucky. However, if sown in established pasture and allowed to seed they may reseed more successfully than the ordinary kind.

Hop Clovers

Of the three hop clovers, only the one known as low hop clover is common in Kentucky. This somewhat leafy plant grows erect and branches widely if not crowded. Its yellow flowers are rather loosely arranged in small but conspicuous heads of much the same shape as red clover. The flowers, however, droop on maturity. Usually its height is between 6 and 10 inches, but it varies from 3 to 18 inches or more, depending upon moisture and soil productivity. The plant is inconspicuous during fall and winter, but during the spring it becomes very noticeable because of its abundant bloom. Only the low hop clover is considered in this discussion, though it applies almost equally to the smaller, somewhat less productive and less common least hop clover (*Trifolium dubium*).

Soil

Hop clover seems to be one of the least sensitive legumes to low soil productivity, but like other worthwhile legumes it is much benefited by soil treatment and makes its best development on good ground.

Use

Observed grazing indicates that the palatability of hop clover varies much from season to season. Livestock graze it readily in some years, but largely avoid it in others. It seems to be quite nutritious, however. Like other pasture legumes it has a beneficial effect on yield and nutritive qualities of the grasses in the pasture.

Hop clover undoubtedly has an imporatnt place in permanent pastures in Kentucky. It is the only winter legume that maintains itself well on soil too poor for white clover, which is the only other legume found abundantly in permanent pastures during winter and spring. Though the plant is widely distributed, it is not sufficiently plentiful in most of those pastures to improve their productivity. It should be sown generally in permanent pastures on soils of lower productivity in Kentucky, especially in southern and western parts.

It is not a simple matter to manage pastures containing hop clover so that the clover recurs regularly, especially pastures of heavy sods, because the grass must be fairly short during fall and early winter to prevent smothering the legume seedlings. This is best avoided by close grazing, but sometimes it is necessary to clip and remove the excess herbage. The hop clover, in turn, should be prevented by grazing or clipping from becoming rank enough during the spring to smother the grasses and other kinds of pasture plants, including Korean and other annual lespedezas.

Hop clover does not seem to produce bloating, but it causes horses and mules to slobber if they graze it much after the seed has matured.

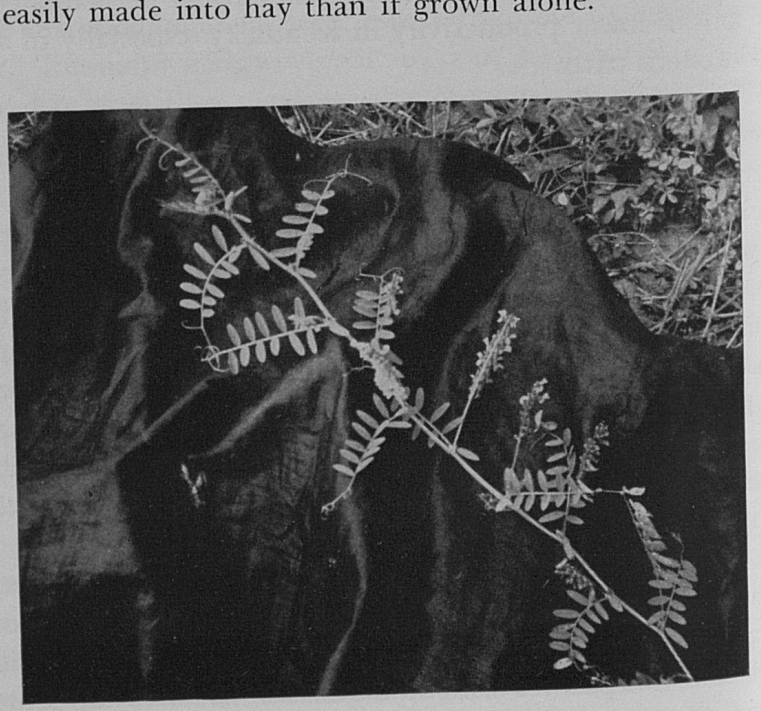
Because of hop clover's usual short growth, it is seldom practicable to make hay or silage of it, though a heavy growth of mixed grass and hop clover in a pasture will make a considerable yield and the pasture will be better for its removal, provided it is not cut closer than average hay stubble.

Unpastured stands of hop clover and excess growth of it may be harvested for seed by cutting with a mower and threshing or hulling when dry. For home use, the material may be scattered thinly over pastures in which it is desired to get a start of the crop.

Hairy Vetch

Winter or hairy vetch is a hairy, purple-flowered, viny legume that has found favor with many farmers in various parts of Kentucky. It behaves normally as a winter annual, but individual plants may live two years. The chief advantages of the crop are its winter hardiness, toleration of soil acidity, and good soil-building and soil-conserving qualities. Objectionable qualities that have prevented wider farm use are its viny and rather prostrate habit of growth, relatively high-acre cost of seeding, and tendency to become a weed in grain fields.

Because of its viny nature and consequent tendency to mat on the ground, vetch is commonly sown with one of the small grains. These support it so that it can be pastured to better advantage or more easily made into hay than if grown alone.



A stem of hairy or winter vetch in bloom

A mixture of vetch and small grain protects and enriches the soil

Soil

Vetch is wholly winter-hardy in Kentucky and adapted to all well drained soils in the state, though many need moderate treatment for satisfactory production of the crop. It is more tolerant of soil acidity than most cultivated legumes, and perhaps no Kentucky soil is so acid that it will not produce good growth of the crop if other soil factors are favorable. The crop also makes fair growth on soil of moderate mineral content, but good growth ought not to be expected on a poor acid soil; consequently, the soil treatments recommended on page 3 are advised for this crop in so far as practicable.

Seeding

Because vetch seed is too large to become covered readily by stubble or other litter on the ground, a seedbed should always be prepared. It makes little difference how it is made, but it should be firm and at least moderately fine. Vetch differs from most cultivated legumes in that the seedlings come through the ground from deep seeding; consequently, it may be sown 3 inches deep if necessary, an advantage in dry weather.

Use

Vetch undoubtedly always will be used in Kentucky, principally for soil improvement and soil conservation for which pur-

poses it has outstanding value, especially for use on soil that for one reason or another is impractical to lime. Alone, it is only moderately satisfactory for pasture because of its prostrate habit of growth and somewhat low palatability. However, when sown with small grain crops these objections are largely removed.

Saving seed

Because of its vining habit, its continuing blooming period, and the tendency of its seed to shatter, vetch is rather difficult to harvest for seed, yet seed yields in Kentucky are good enough to justify at least limited growing of the crop for seed. Average yields of vetch seed in Kentucky vary from 200 to 250 pounds per acre, but individual crops may make twice as much if shattering can be prevented.

Seed crops of vetch may be grown alone, but they are easier to harvest when grown with small grain. The crop may be cut, cured in the windrow or stack, and threshed with a grain thresher or a combine. While it is possible to combine a mature-standing crop, it is usually much better to cut and cure vetch before threshing. Only when grown with small grain can vetch be harvested with a binder, and even then it may be somewhat difficult to harvest. Pure stands of vetch may be allowed to mature, raked into windrows without mowing and threshed. Vetch and small grain seed mixtures can be separated with a special separator.

Black Medic

Black medic is also commonly known as yellow trefoil. Though many plants are biennial under favorable conditions, the species is essentially a winter annual. It is frequently mistaken for hop clover because both flower at about the same time and the blooms appear much alike. However, it can readily be distinguished from hop clover by its prostrate growth, rather square, pubescent stems, and large, rather compact group of seed pods. Under favorable conditions, black medic in Kentucky makes a mat 6 to 10 inches thick by early summer. Ordinarily, however, it produces less than half this amount, so that the plant may be considered only a pasture legume.

Black medic in a Kentucky bluegrass pasture

Soil

Black medic grows on a wide variety of soils, provided they are not strongly acid, but it is of practically no value in Kentucky except on the better soils. The plant is a close relative of alfalfa and has similar but somewhat less exacting soil requirements. Though it is adapted to soil of rather low available mineral content, it responds to the soil treatment recommended on page 3.

Use

The palatability, nutritive value, and relatively low-acre cost of black medic are qualities that commend it for permanent pasture mixtures in Kentucky. Were it not for its too aggressive growth under some conditions, it could be recommended without reservation. Until more is known regarding its habits in permanent pastures, however, it should be sown only for trial.

Experience in seeding the crop in pastures for the first time in Kentucky has been somewhat discouraging because only poor to fair stands were obtained. Perhaps failure to get complete inoculation of the seedlings is a principal cause of failure, because once a thin stand is obtained it usually becomes much better. It seldom, however, produces as heavy growth as lespedeza.

As this plant has about the same relation to other species of plants in a pasture as hop clover, it seems that pasture management for maintaining black medic in the proper relation to other plant species should be essentially as described for the pasture containing hop clover.

Bur Clovers

Two bur clovers may be of some value to Kentucky farmers—the southern bur clover (*Medicago arabica*) and Tifton bur clover (*Medicago rigidula*). Both are prostrate in growth and otherwise similar in appearance, except that the latter lacks the dark purple-spotted leaf of the former. Both are highly valued in the Cotton Belt for early pasture and soil improvement.

Though these crops are sufficiently winter-hardy for use in southwest Kentucky if sown with ryegrass or a winter grain, they should be grown only in a small way until their adaptability is determined. The Tifton species is reported to be more winter-hardy than the southern bur clover.

Both species produce seed in a bur-like pod, and most of the seed on the market is in that form. It may be sown without inoculation because the organism is carried in the particles of dirt adhering to the burs. However, it would be well to inoculate the seed with commercial inoculant. The hulled seed should be inoculated. The burs are large. They should be sown in such a way that they are covered lightly.

Button Clover

Button clover is similar to southern bur clover in habit of growth and soil adaptation. On the whole, the discussion of the culture and agricultural value of southern bur clover applies to button clover, with the important exception that button clover is seeded essentially the same as black medic because commercial seed is normally hulled. Difficulty of harvesting the button clover seed has resulted in limited supplies.

Button clover (*Medicago orbicularis*) is a leafy, yellow-flowered annual legume. Its stems are rather slender; consequently, they grow more or less prostrate. The seeds are borne in large, coiled pods, which somewhat resemble thick buttons.

Little is known about the adaptation and usefulness of button clover in Kentucky. It is perhaps sufficiently winter-hardy to live through most winters. Apparently it requires productive soil for good growth. Lime and fertilizer treatments should be similar to those used to grow red clover.

In Kentucky, button clover should be sown in August on a good, firm seed bed at a rate of about 25 pounds of seed per acre. Drill the seed at a depth of about ½ inch, or broadcast the seed and cover with a cultipacker. When sowing in a permanent pasture, disk the sod sufficiently to cover the seed. The seed should be inoculated. The plants may not become well inoculated when first sown on a piece of land; consequently, the first stand may make disappointing growth. Stands will make better growth the second year.

Button clover produces a large percentage of hard seed; consequently, it volunteers, following stands that produce good seed crops, if soil conditions are satisfactory for germination. Good volunteer stands will occur in cultivated row crops. Otherwise it may be necessary to disk the land once in July and again later. Button clover should not be seeded on land that will be used for small grain production. Its seed is objectionable in small grains.

Button clover is excellent for pasture and it makes good hay, but since it must be cut in May or early June, the weather usually will prevent the production of high quality hay. It is worthy of trial seedings wherever hairy vetch or crimson clover has been found useful.

When To Sow Winter Legumes

Kind of legume	North and east Kentucky	South and west Kentucky
Seeded alone on specially prepared seedbed		
Crimson clover	Aug. 5-20	Aug. 10-Sept. 1
Hop clover	Not recommended	Not recommended
Vetch	Aug. 15-Sept. 10	Aug. 25-Sept. 20
Black medic	Not recommended	Not recommended
Bur clover	Not recommended	Aug. 10-Sept. 1[1]
Button clover	Not recommended	Aug. 10-Sept. 1[1]
Seeded with small grain or Italian ryegrass		
Crimson clover	Aug. 15-Sept. 10	Aug. 20-Sept. 20
Hop clover	Not recommended	Not recommended
Vetch	Aug. 15-Sept. 20	Sept. 1-Oct. 1
Black medic	Not recommended	Not recommended
Bur clover	Not recommended	Aug. 20-Sept. 20[1]
Button clover	Not recommended	Aug. 20-Sept. 20[1]
Seeded in sod		
Crimson clover	Aug. 15-Sept. 15	Sept. 15-Oct. 1
Hop clover	Sept. 5-Oct. 10	Sept. 15-Oct. 20
Vetch	Not recommended	Not recommended
Black medic	Sept. 5-Oct. 10	Sept. 10-Oct. 20
Bur clover	Not recommended	Sept. 1-Oct. 1[1]
Button clover	Not recommended	Sept. 1-Oct. 1[1]

[1] Recommended with reservations; see text.