Sainfoin Production in New Mexico

Guide A-311

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Figure 1. **Sainfoin at approximately 75% bloom. Blooming starts at the base of the raceme (flower stalk) and progresses upward. Pods below the blooms have already begun seed formation, and buds above the blooms have not opened yet.**

Sainfoin (*Onobrychis viciifolia* Scop.) is a forage legume that has generated continual interest, likely because it has previously demonstrated a production potential of 1,200 lb beef weight gain/ac. Sainfoin was first brought to the US from Eurasia in the 1880's, but its merits were overlooked until the alfalfa weevil forced research into alternative legumes. Sainfoin is adapted to calcareous soils with good drainage, is more palatable than it looks, is resistant to the alfalfa weevil, and does not cause bloat, which also generates interest. In addition, it has an apparent relatively low water requirement compared to alfalfa. Sainfoin can grow taller than alfalfa and has hollow stems, pink flowers, and leaves similar to vetches (Figure 1).

GROWTH TYPES

Sainfoin varieties are grouped into types that produce vigorous regrowth after cutting and those that do not. Single-cut types produce the majority of their forage yield in one cutting in the spring and then remain semi-dormant during the remainder of the summer. These single-cut sainfoins are very winter-hardy and are recommended for dryland pasture usage in their area of adaptation, which is the northern Great Plains and Canada.

The regrowth types produce more uniformly over the growing season and have a more upright growth habit than the single-cut types; therefore, they are more adapted to hay production and New Mexico growing conditions and are available for grazing over a longer period. The variety 'Remont' was developed by the Montana Agricultural Experiment Station and released in 1971. 'Renumex' was selected by the New Mexico State University Agricultural Experiment Station from 'Remont', 'Eski', and other Montana germplasms and released in 1977. Throughout the southern two-thirds of New Mexico, 'Renumex' outyields 'Remont' and has better stand persistence, but 'Remont' has better winter hardiness. Several other regrowth-type varieties have been released for use in more northern latitudes since 1980; however, none will likely be as adapted to New Mexico as 'Renumex'.

FORAGE PRODUCTION AND NUTRITIVE VALUE

The production pattern of sainfoin is different from alfalfa. Sainfoin initiates growth earlier in the spring and produces a greater percentage of total yield by July. Sainfoin can yield more forage than alfalfa in May and June, and then tends to decrease in productivity for the remainder of the growing season. Under hay management, sainfoin yields were about 50–60% of alfalfa in most parts of New Mexico under full irrigation. Under

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rainfed conditions in east-central New Mexico, sainfoin yields were 20% of alfalfa, and the stand did not persist beyond the first harvest of the second year.

The nutritive value of alfalfa and sainfoin is similar, with alfalfa having 20–22% crude protein and sainfoin having 19–21%, although sainfoin nutritive value does not decline with maturity to the degree that alfalfa does. This characteristic allows for longer harvest intervals that permit seed production for stand persistence. Animal performance with regard to average daily gains, consumption, feed efficiency, and digestibility is also similar, with the added benefit that sainfoin does not cause bloat.

STAND ESTABLISHMENT AND PERSISTENCE

Sainfoin seeds are contained in one-seeded pods. The pods are not generally removed during threshing. They are brown, rough-surfaced, and frequently spiny. Seedpods make up approximately 30% of the total seed fruit weight. Sainfoin seeds themselves are similar in color to alfalfa seeds but are much larger, at about 30,000 seeds per pound compared to 220,000 seeds per pound for alfalfa.

Generally, the entire pod is planted. Recommended planting rates range from 25 lb/ac for dryland to up to 40–50 lb/ac under irrigation for unhulled seed. The characteristic spiny pods may stick together and plug the planter, so planting equipment should be checked often to ensure a uniform stand. Sainfoin seed should be inoculated with sainfoin-specific *Rhizobium* bacteria prior to planting because inoculants for alfalfa and other legumes are not effective. Even when well-inoculated, nodulation by sainfoin is not consistent.

Seedbeds should be uniform, firm, and well-prepared. Optimum planting depth (about 3/8 in.) and time are similar to alfalfa. Sainfoin will produce normal yields in the first production year if seeded in late summer or fall. Spring seedings are not recommended because sainfoin grows slowly in the first year and produces about half the yield that it would in the second growing season. Additionally, irrigation and weed control costs are lower with late summer/early fall seedings, as with alfalfa. Even when initial stands are less than optimum, ground cover will increase with proper harvest management through crown expansion and seed production; the latter contributes most to stand persistence.

Sainfoin can be grown as a monoculture or in mixtures with other forage species. In pure stands, sainfoin can be broadcast seeded or drilled in rows. Sainfoin has a soft crown that cannot withstand damage by livestock or equipment, and it is susceptible to several crown and root diseases that gain entrance through wounds. Using wider rows spaced for equipment wheel traffic can minimize crown damage and prolong stand longevity. Under furrow-irrigated conditions, planting on the beds also will minimize crown damage.

Sainfoin can be sown in pastures with several grasses, including clump grasses and spreading grasses. When sown in mixtures, the companion species should not be planted in the same row, and instead should either be planted in alternate rows or one drilled (sainfoin) and the other broadcast to minimize competition during establishment. Companion species should be selected to complement sainfoin's palatability, season of use, and management system.

Stand persistence is primarily dependent on cultural conditions and management practices. Stands have been lost in two years or less, but other fields have remained productive for four or five years without noticeable stand reduction. Factors associated with persistence or lack thereof include flooding (poor soil drainage with waterlogging), drought, control of equipment and livestock traffic, applications of nitrogen fertilizer, harvest stubble height, and timing with regard to seed production, grazing, and crown and root rots.

MANAGEMENT

Even though sainfoin is a legume that should be able to meet its entire nitrogen requirement via its symbiotic relationship with *Rhizobium* bacteria, nitrogen applications have been beneficial in other states (bacterial nodulation was most likely poor in these situations). Stand decline also has been observed when nodulation was low and N fertilizers were not applied. No benefit, however, was observed from the application of 20 lb actual N/ac five times from March through August in eastern New Mexico or up to 180 lb actual N/ac applied prior to green-up in north-central New Mexico.

Sainfoin has been successfully interseeded into rangeland in Montana and Canada. This also may be possible in areas of New Mexico that receive 25 inches or more of precipitation annually; however, some irrigation will be required in most areas, even during the summer when sainfoin is less productive. In fact, recent research in eastern New Mexico demonstrated that stand persistence and yield benefited from year-round irrigation compared to irrigation during the growing season only. Additionally, because sainfoin initiates growth earlier than alfalfa, irrigation must be applied earlier. While sainfoin yield potential is much lower than alfalfa when all other factors except harvest management are equal (indicating that alfalfa uses water more efficiently), the response by sainfoin to varied irrigation levels is similar to alfalfa. Still, sainfoin yields were not affected by

limited irrigation during summer in north-central New Mexico, but alfalfa yields were. Consequently, producers may save water and use less total water by reducing irrigation frequency after sainfoin's period of active growth.

Sainfoin appears to be best adapted to rotational grazing systems in which stocking density is sufficient to reduce the pasture to a 4- to 6-in. stubble in 10 days or less before stock are rotated to the next pasture. Regrowth should be sufficient to graze again in 28–30 days, but grazing should not be initiated until the stand achieves 50% bloom.

SEED PRODUCTION

Seed production is considerably easier with sainfoin than with alfalfa. Planting rates are generally 6–10 lb/ac in rows 24–38 in. apart. Double rows on beds, like those for hay or grazing, appear to be satisfactory. The first spring growth produces the highest seed yield, but three to four seed crops have been produced annually in southern New Mexico, with seed yields ranging from 50 to over 1,200 lb/ac, with an average of 300 lb/ac.

Honeybees are excellent pollinators for sainfoin, requiring two to four colonies per acre during the peak bloom period. Although sainfoin also is susceptible to lygus, control measures are the same as for alfalfa. Sainfoin does not appear to be as sensitive as alfalfa to low or excessive soil moisture during the reproductive phases.

A primary problem in sainfoin seed production is the lack of uniformity in seed maturity. Sainfoin starts blooming at the base of the raceme (flower stalk) and progresses upward. Consequently, a single raceme will have both well-formed seedpods and flowers at the same time. This is further complicated by the fact that sainfoin is susceptible to seed shattering. If all pods are allowed to mature, many of the lower pods will be lost to shattering. Studies in southern New Mexico indicate that harvest should be taken when at least 30% of the pods have turned brown, which may necessitate swathing to promote drying prior to threshing.

CONCLUSION

Although sainfoin has its limitations, it does have value as a high-quality, non-bloating legume for early season forage production in low input systems in most of New Mexico. For additional information about sainfoin, contact your County Cooperative Extension office or visit the NMSU Cooperative Extension Service publications Web site (http://aces.nmsu.edu/pubs/).

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