

Fertilizer Use In Forage Establishment

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A serious deterrent to production of forage species is the uncertainty associated with establishment of a thick vigorous stand. Vigorous stands are essential where production is desired during the year of establishment from forages direct seeded without a companion crop. The use of certified seed of recommended varieties, inoculation of legume seeds, early spring seeding on a fine, firm seedbed, as well as the correct choice and placement of fertilizing materials, are essential steps in achieving a thick vigorous stand.

"Band-seeding" is a technique which assures correct placement of the seed and fertilizer. With this technique, the fertilizer is placed $1\frac{1}{2}$ to $2\frac{1}{2}$ inches (5.7 to 6.2 cm) directly below the forage seed; the seed placed on the soil surface (Figure 1).

Most commercial seed drills may be adapted to carry out band placement. The seed is carried to within 3 to 4 inches (7.6 to 10.2 cm) of the soil surface by extended plastic or metal tubes. On some drills the grass seed box may be remounted on the back of the drill to shorten the length of the seed tubes. The tubes may be rigidly fastened to the furrow opener to drop the seed 4 or 5 inches (10.2 to 12.7 cm) behind the furrow opener as in Figure 1. Feeding the seed tube through short pieces of pipe attached to the footboard, as illustrated in Figure 2, is preferred. The tube is subject to less vibration, hence less scattering of the seed, than when attached to the furrow opener. Reduction of the tractor speed to 4 miles (6.4 km) per hour, or less, also reduces vibration and aids in locating the seed over the fertilizer.

Shallow covering of the seed can be accomplished by drag chains or preferably by a small $1\frac{1}{2}$ -inch (5.7 cm) wide packing wheel rolling behind each furrow opener. Where packing wheels are used, less compaction of the soil surface occurs than with field rollers or other packing machinery. Erosion problems are reduced while germination and emergence is more rapid and uniform.

The primary nutrient required for vigorous establishment is phosphorus. The value of phosphorus and the importance of the location of the seed directly over the fertilizer are illustrated in Table 1. The placement of the phosphorus band 2 inches (5 cm) below the soil surface and $1\frac{1}{4}$ inches (3.2 cm) to one side of the seed seriously reduces the weight of the plants. Through the use of radioactive phosphorus it was shown that 89% of the phosphorus uptake in both alfalfa and bromegrass was obtained from the phosphorus fertilizer when the band was located directly

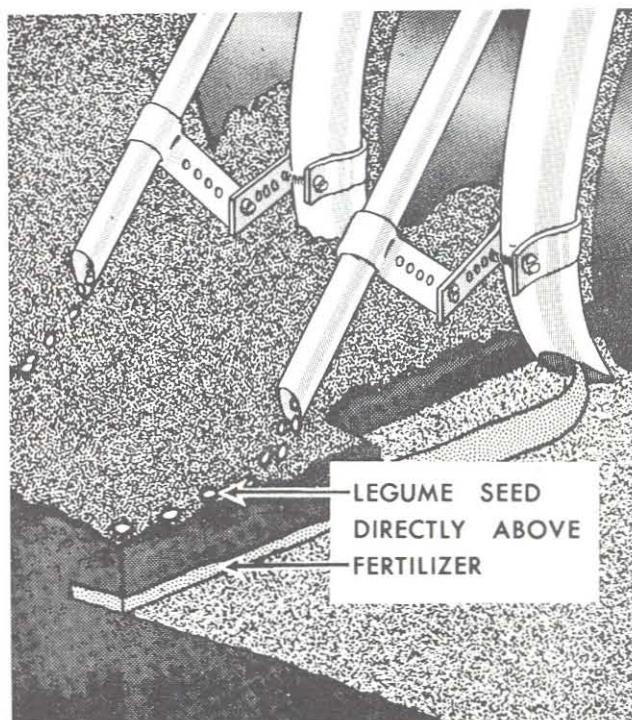


Figure 1. Band-seeding insures a vigorous stand of forage seedlings.

below the seed; the phosphorus uptake was reduced to 62% when the band was located $1\frac{1}{4}$ -inches (3.2 cm) to one side and to a trace where the band was located $3\frac{3}{4}$ inches (9.5 cm) inches away.

Table 1. Significance of the horizontal placement of 61 pounds (54.0 kg/ha) of P_2O_5 applied at a depth of 2 inches (5 cm) on the seedling weight of alfalfa and bromegrass 29 days after seeding.

Species	Without Phosphorus	Horizontal placement of phosphorus band			
		0 cm 0 in.	3.2 cm $1\frac{1}{4}$ in.	6.4 cm $2\frac{1}{2}$ in.	9.5 cm $3\frac{3}{4}$ in.
(mg/plant)					
Alfalfa	18	52	28	22	16
Bromegrass	20	63	26	23	19

Increased vigor from band seeding has been obtained on soils testing both low and high for phosphorus

(Table 2). Small seeded forages need a large, readily available source of phosphorus right after germination. Where adverse weather conditions are experienced during the establishment period, the readily available source of phosphorus becomes more critical. As a general recommendation it is suggested that phosphorus be band-seeded at a rate of 30 pounds (27 kg/ha) of phosphate per acre to insure vigorous establishment of all forage species. The rate of application should be increased where the soil test indicates a higher requirement. If your soil tests very high in phosphorous, it may not be economical from a yield increase standpoint to band phosphate.

Table 2. Plant weight of band-seeded alfalfa 7 weeks after seeding on soils testing low and high for phosphorus.

	Low Soil Test (Test value — 7)	High Soil Test (Test Value — 22)
Phosphorus requirement	65 lb P ₂ O ₅ /ac (58.5 kg P ₂ O ₅ /ha)	0 lb P ₂ O ₅ /ac (0 kg P ₂ O ₅ /ha)
Seedling Weight without P ₂ O ₅	60 mg/plant	120 mg/plant
Seedling weight with 30.5 lb P ₂ O ₅ /ac (27.5kg/ha)	239 mg/plant	301 mg/plant
Seedling weight with 61 lb P ₂ O ₅ /ac (55 kg/ha)	276 mg/plant	344 mg/plant

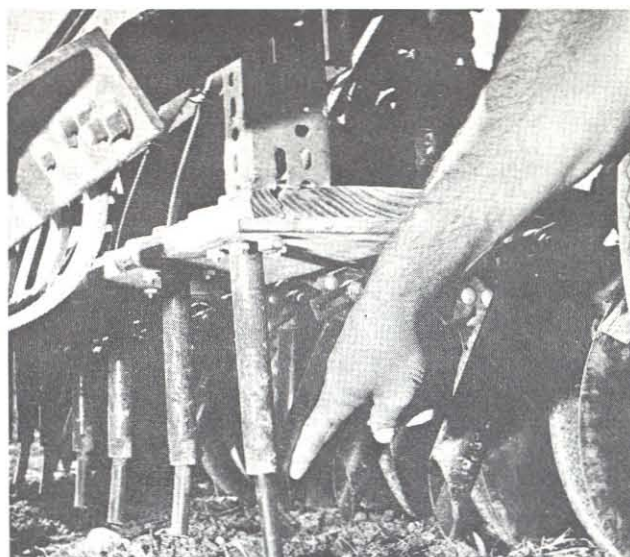


Figure 2. Attachment of the seed tube to the footboard. Note brome-grass spouts ahead of legume seed tube.

Increased vigor from band-seeding nitrogen or potassium has not been demonstrated. Where the soil test indicates potassium is required, it may be included in the band as a mixed fertilizer. Additional applications of phosphorus and potassium for subsequent production may be necessary in the fall of the establishment year. A soil test is necessary to establish the appropriate rate for such applications (see Ontario Ministry of Agriculture and Food publication 181, *Help Yourself to a Soil Test*).