

NEW INOCULATION TECHNIQUE FOR CLOVERS

G. W. Evers, J. L. Gabrysch, and J. M. Moran

Background. The ability of clovers to grow well and use nitrogen (N) from the air is dependent on early infection by specific types of bacteria through the root hairs. These bacteria are responsible for forming nodules on clover roots and transforming gaseous N from the air into ammonium (NH₄) which can be used by the clover plant. There are many strains of *Rhizobium* bacteria which infect legumes and vary in the amount of N they fix. Inoculum containing specific strains are applied to the clover seed at planting to ensure that the best strains are present when the clover seed germinates. Some new inoculation methods were evaluated on arrowleaf clover at the Texas A&M University Agricultural Research and Extension Center at Overton. HiStick, HiStick-experimental, and HiCote were compared to Pelinoc, uninoculated seed, and uninoculated seed + 60 lb N/acre at planting. Ten arrowleaf clover seedlings were removed from each plot 6 weeks after planting to record leaves, nodules, and dry weight per seedling. Plots were harvested 2 Apr. and 5 June, 1991 to determine yield.

Research Findings. All treatments except the uninoculated treatment resulted in a similar number of leaves per seedling (Table 1). Seedlings from the four inoculation techniques averaged from 11 to 15 nodules per seedling. The two uninoculated treatments averaged less than two nodules per seedling which indicates there were few native rhizobia present at the test site capable of infecting arrowleaf clover seedlings. Weight of seedlings from the HiCote and HiStick-experimental treatments was similar to the seedlings from the uninoculated + 60 lb N at planting treatment. This demonstrates that these two inoculation treatments were meeting the N requirements of the seedling. Weight of seedlings from the HiStick and Pelinoc treatments were slightly less. Arrowleaf seedlings from the uninoculated treatment were stunted because of N deficiency.

Dry matter yields at the first harvest (Table 2) were directly related to nodules per seedling 6 weeks after planting. Yield from the Pelinoc treatment was slightly less than HiCote, HiStick, and HiStick-experimental treatments. Forage yield of the uninoculated treatment was 70% less than the better inoculation treatments. The 60 lb N at planting met the N needs of the clover seedling for the first 6 weeks in the uninoculated + 60 lb N treatment. But by the first harvest, clover growth was severely restricted by insufficient N. There were no significant yield differences between treatments by the second harvest. It is not uncommon for large differences in nodulation at the seedling stage to decrease during the clover growing season. Rhizobia in

poorly nodulated seedlings multiply rapidly with increasing temperature in the spring to improve nodulation. Protein yields of arrowleaf clover from the various treatments followed the same trend as total dry matter yield for the season.

Application. These data from one year of testing indicate that HiStick, HiCote, and HiStick-experimental are equal to Pelinoc and satisfactory for inoculating arrowleaf clover. HiStick was available for the first time at selected locations in East Texas this past autumn.

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Table 1. Influence of inoculation procedure on leaves, nodules, and weight of Yuchi arrowleaf clover seedlings, 6 weeks after planting.

Inoculation Treatment	Leaves	Nodules	Dry weight
HiCote	3.63 a [†]	13.6 ab	0.4847 a
Pelinoc	3.18 b	11.8 b	0.3344 c
HiStick	3.23 ab	13.2 ab	0.3555 bc
HiStick (exp.)	3.58 ab	15.1 a	0.4401 ab
Uninoculated	2.55 c	1.1 c	0.2075 d
Uninoculated + N [‡]	3.48 ab	1.7 c	0.4545 ab

[†]Values within a column followed by the same letter are not significantly different at 0.05 level, Waller-Duncan Multiple Range Test.

[‡]Sixty lb N/acre applied to soil surface on day after planting.

Table 2. Influence of inoculation procedure on dry matter yield of Yuchi arrowleaf clover.

Inoculation Treatment	Dry matter production			Protein
	2 April	5 June	Total	
	-----lb/acre-----			
HiCote	1394 a [†]	3220 a	4614 ab	682 ab
Pelinoc	1034 b	3152 a	4186 b	571 c
HiStick	1363 a	2944 a	4307 ab	616 bc
HiStick (exp.)	1377 a	3337 a	4714 a	706 a
Uninoculated	388 c	2887 a	3275 c	375 d
Uninoculated + N [‡]	525 c	2937 a	3462 c	428 d

[†]Values within a column followed by the same letter are not significantly different at 0.05 level, Waller-Duncan Multiple Range Test.

[‡]Sixty lb N/acre applied to soil surface on day after planting.