ANOTHER LOOK AT NURSERY BED MULCHES AND STICKERS

K. O. Summerville [1/]

Abstract. -- Materials to use for nursery bed mulch vary over a period of time because of availability and cost. This study was developed to evaluate currently available native materials and manufactured products. Five mulches (chopped pine needles, chopped grain straw, sized pine bark, sawdust, and an excelsior mat) and three stickers (Polysar, Terra Tack, and AzTac) were evaluated on loblolly pine seedbeds. Data was collected on seed germination, condition of mulch, total number of seedlings, number plantable seedlings, percentage (%) cull seedlings, seedling diameter and oven dry weight of seedlings. Differences were found in seed germination varying with mulch or sticker used. The effectiveness of each mulch and sticker over time was very dramatic.

Many different mulch materials have been, are being and will be used on forest tree nursery seedbeds. The North Carolina Division of Forest Resources has used or is using chopped pine needles, sized bark, grain straw, sawdust, hydromulch, and wood chips on pine and hardwood seedbeds. Along with the use of these mulches bonding agents (stickers) have been tried. The reason for using such a variety of materials has been their availability. Bland (1973) studied the effects and cost of mulches on loblolly pine.

Chopped pine needles is considered the best mulch materials to use on loblolly pine beds (Oliveira and Bridi, 1976). But it is time consuming to stockpile and prepare pine needles for use on the beds.

This study was initiated to evaluate mulches that are readily available. Recognizing that some mulches are light and do not stay on the beds well without help stickers were screened also. Five mulches, chopped pine straw, chopped grain straw, sawdust, sized pine bark and an excelsior mat were used with three different stickers [2]; Polysar, Terra Tack and AzTac. The study was conducted on loblolly pine seedbeds.

---

[1] Tree Improvement Staff Forester, North Carolina Division of Forest Resources, Griffiths Forestry Center, Clayton, North Carolina.

[2] The mention of a company or trade name does not imply endorsement by the North Carolina Division of Forest Resources.

METHODS

Seedbeds were made up in a routine fashion in fumigated soil in 1983. Loblolly pine seed was broadcast sown on top of beds and firmed into the soil by rolling. Mulches were applied over the seedbeds and sticker material sprayed over the mulches. A pre-emergence herbicide Goal 2E was sprayed at the rate of 2 pint/acre before the stickers were applied.

The five mulch treatments were randomly placed on each of four separate seedbeds. One type of sticker treatment was applied to each seedbed. This arrangement of mulch/sticker treatments provided four replications of mulch but none for stickers. Five points for data collection were established in each mulch treatment plot. The data collection points were spaced equally through the treatment plot. Each mulch treatment plot was fifty feet of bed length. At each data collection point a one-foot wide area across the bed was used where a counting frame was placed. The counting frame was one-foot wide by four-feet long and separated into four equal parts (one square foot sub-plots). One sub-plot per data point was randomly designated to take seed germination and mulch condition. At the end of the study this data collection point was used to get a seedling sample. All seedlings at the one-foot wide area across the bed were lifted. Total number seedlings, number of plantable seedlings were determined to yield a cull per cent. Twenty seedlings from the total were randomly chosen to measure root collar diameter, height, and oven-dry weights of total tree.

The observations on mulch condition were converted to a quantitative value as follows: thick or good, 1/4 inch (.25 in.); medium or fair, 1/8 inch (.125 in.); and thin or poor, 1/16 inch (.0625 in.). Per cent of cover was given the following quantitative value: bare areas up to -50%, bare edges -10%, bare spots -5%. Net mulch values were determined by multiplying thickness value (1/4 thru 1/16 inches) by per cent cover.

The sticker materials were applied at the following rates: Polysar - 10 gal/acre, AzTac - 60 lb/acre, and Terra Tack - 40 lb/acre.

RESULTS AND DISCUSSION

The first data collected was on seed germination (Table 1) and illustrates the effect of mulch color on early seed germination. The lighter colored mulch materials had low seed germination counts. This

STICKER TYPE	MULCH TYPE	#No. of Seedlings /sq. ft.			
		6/14	6/30	7/15	7/28
Terra Tack	Excelsior	0.0	21.4	27.0	23.0
	sawdust	1.6	25.6	29.4	28.0
	pinestraw	0.6	**33.4**	**34.2**	**32.6**
	grainstraw	0.0	24.8	27.0	26.0
	pinebark	1.0	21.8	26.2	24.0
Control	Excelsior	0.0	28.0	31.4	30.0
	sawdust	2.0	22.2	27.0	26.0
	pinestraw	0.6	29.4	32.0	30.0
	grainstraw	0.0	25.8	26.4	26.2
	pinebark	1.4	16.6	19.8	18.8
Polysar	Excelsior	0.4	21.2	30.0	27.0
	sawdust	1.2	22.6	25.0	23.4
	pinestraw	0.8	30.8	31.6	31.0
	grainstraw	0.0	25.0	22.4	23.4
	pinebark	**2.6**	21.4	24.6	24.4
Az-Tac	Excelsior	0.0	22.2	25.8	23.0
	sawdust	2.4	24.0	27.8	23.0
	pinestraw	0.2	29.4	30.6	26.4
	grainstraw	0.0	10.2	8.4	7.2
	pinebark	0.6	21.0	21.0	20.8
Average		0.77	23.84	26.38	24.71

Table 1 : Averaged Data on Loblolly Pine Seed Germination Over Time

is attributed to less solar heat build up with the lighter colored materials. This negative effect on seed germination was lost by the second week of germination. The influence of mulches on germination is established early and in most incidences holds true until the seedlings are harvested as is illustrated in Figure 1. Figure 2 illustrates the influence stickers may have on seed germination in this unreplicated portion of our study.

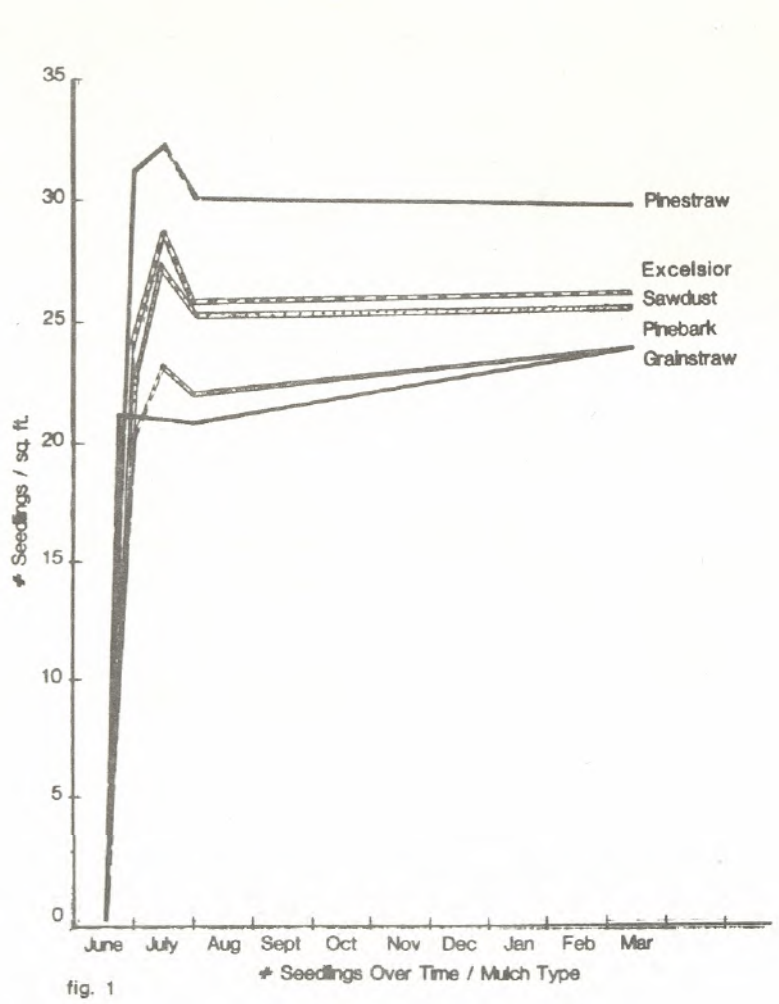
35
30
25
20
15
10
5
0
Seedlings / sq. ft.
Pinestraw
Excelsior
Sawdust
Pinebark
Grainstraw
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Seedlings Over Time / Mulch Type

fig. 1

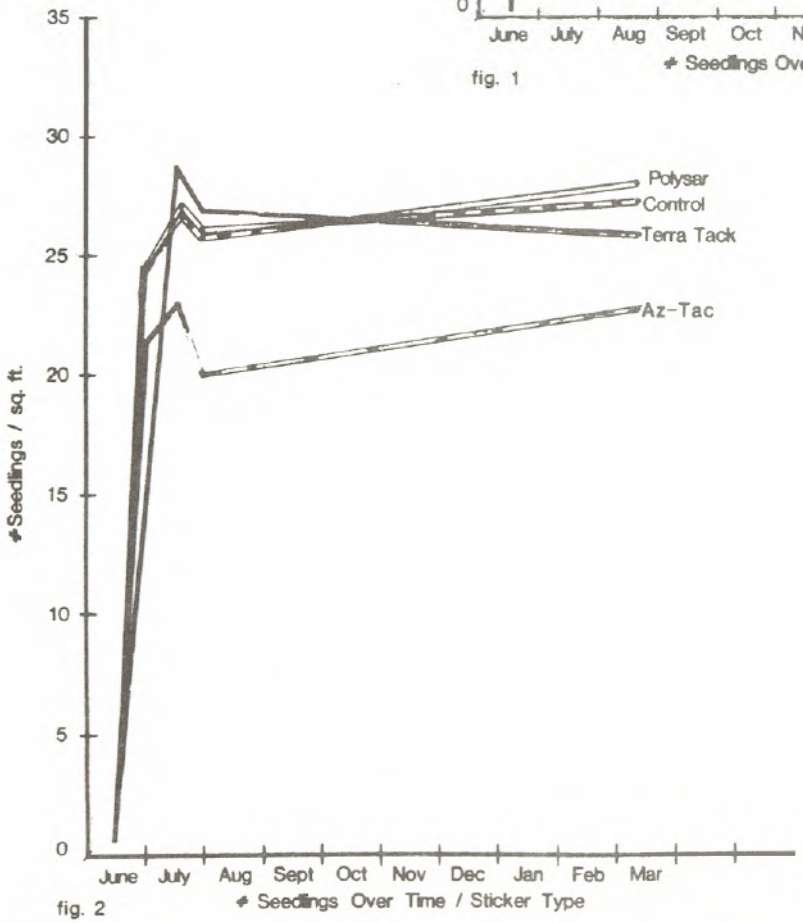
35
30
25
20
15
10
5
0
Seedlings / sq. ft.
Polysar
Control
Terra Tack
Az-Tac
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Seedlings Over Time / Sticker Type

fig. 2

		Diameter (inches)	Oven Dry Weight	%Cull	#Plantable per sq. ft.
Sticker	Terra Tack	**0.1640**	**3.3880**	10.5840	23.560
	Control	0.1500	2.7460	15.7700	22.900
	Polysar	**0.1640**	2.9140	**7.4240**	**25.480**
	Az-Tac	0.1600	3.1840	7.9180	21.020
Mulch	Excelsior	0.1425	2.7975	**7.3975**	24.525
	sawdust	**0.1650**	**3.3550**	9.9450	23.675
	pinestraw	0.1550	2.7750	8.2400	**26.375**
	grainstraw	0.1625	3.1000	12.1850	20.775
	pinebark	**0.1650**	3.2625	12.2925	20.850

Table 2
Combined Averages of Data For Stickers And Mulches On Loblolly Pine Seed Beds

When mulch performance is evaluated by seedling qualities (Table 2) pine straw yields the highest number of plantable seedlings. But the lowest cull percentage occurs with excelsior. Sawdust mulch produced the best average root collar diameter and oven dry weight.

Figures 3-7 illustrate the trend of sticker performances in relation to the various mulches included in the study. All stickers performed well with excelsior and pine straw (Figures 3 and 4). Sticker performance had

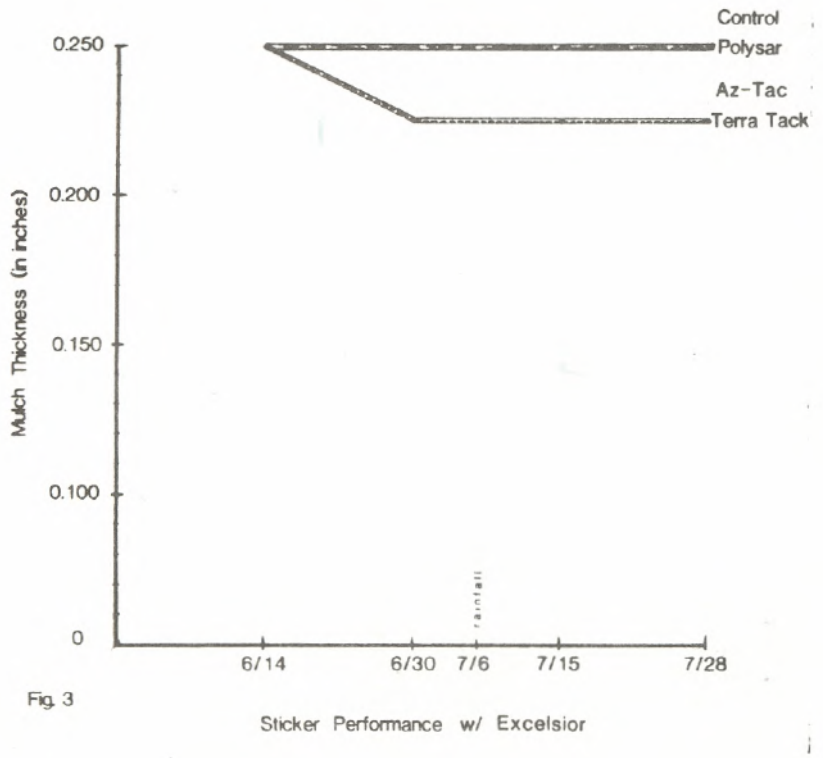

Fig. 3
Sticker Performance w/ Excelsior

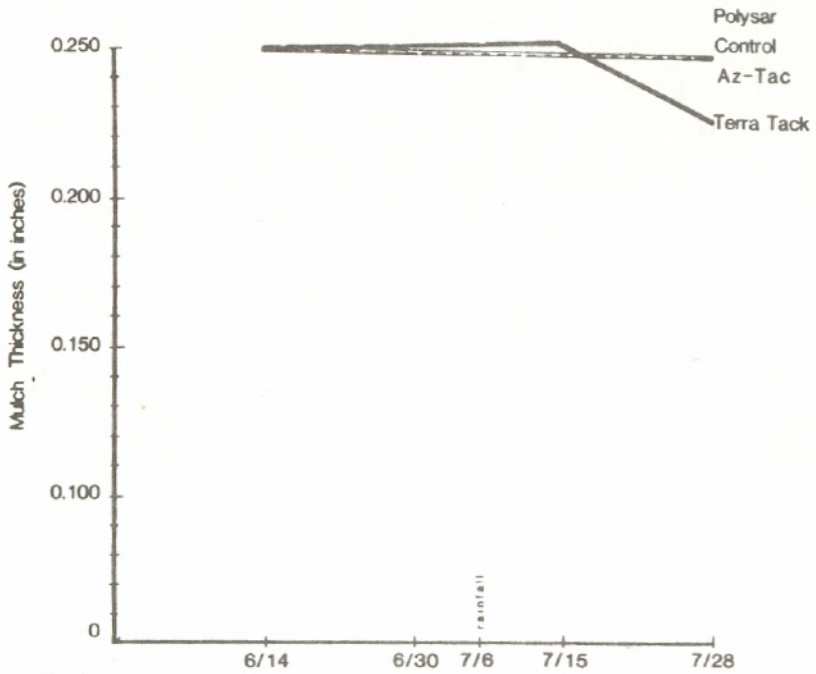

Fig. 4

Sticker Performance w/ Pinestraw

the greatest degree of fluctuation in effectiveness with sawdust, grain straw, and pine bark (Figures 5, 6 and 7). Two of these mulches also illustrate an interesting factor about rainfall. On 5 July 1983, the

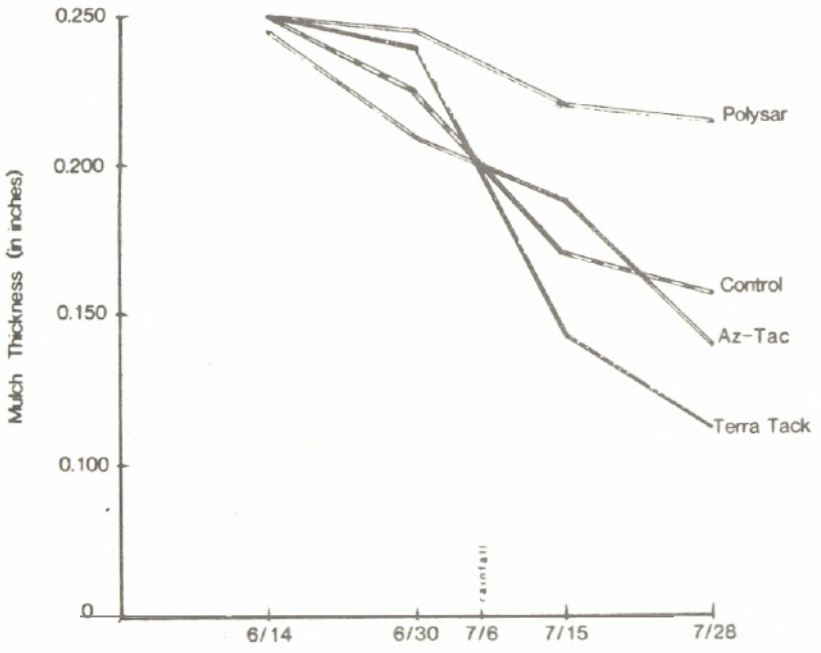

Fig. 5

Sticker Performance w/ Sawdust

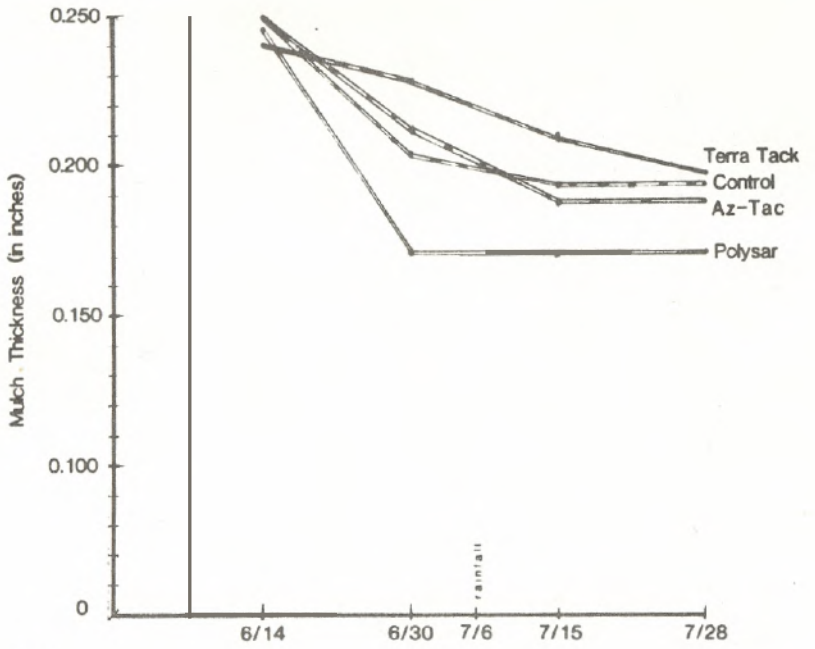

Fig. 6

Sticker Performance w/ Grainstraw

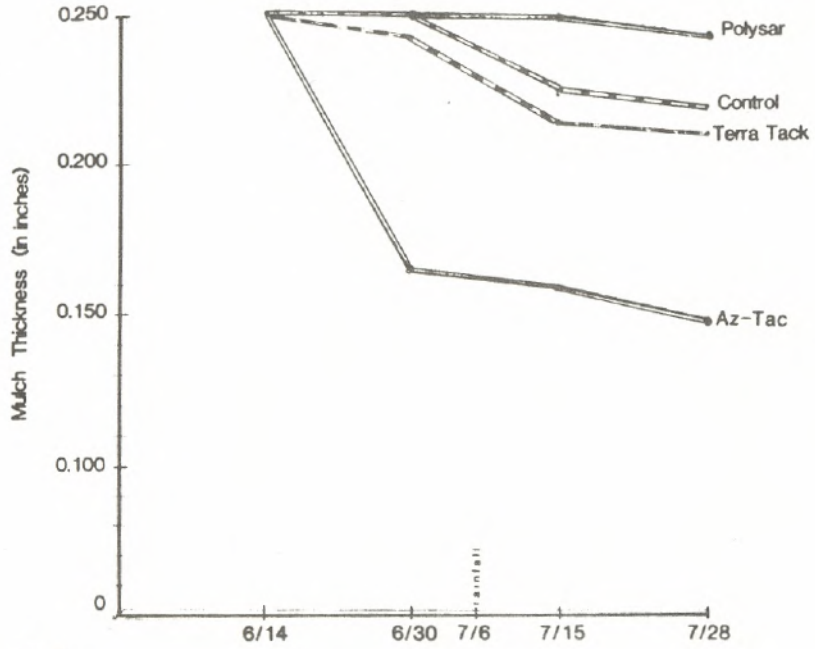

Fig. 7

Sticker Performance w/Pinebark

nursery area sustained a summer rainstorm that produced 1.55 inches of rain in a short period of time. After this date a rapid decline in mulch thickness occurred to the sawdust and pine bark no matter which sticker was applied. Figure 8 best illustrates the trend that this study reveals on sticker performance when all mulch response is averaged together.

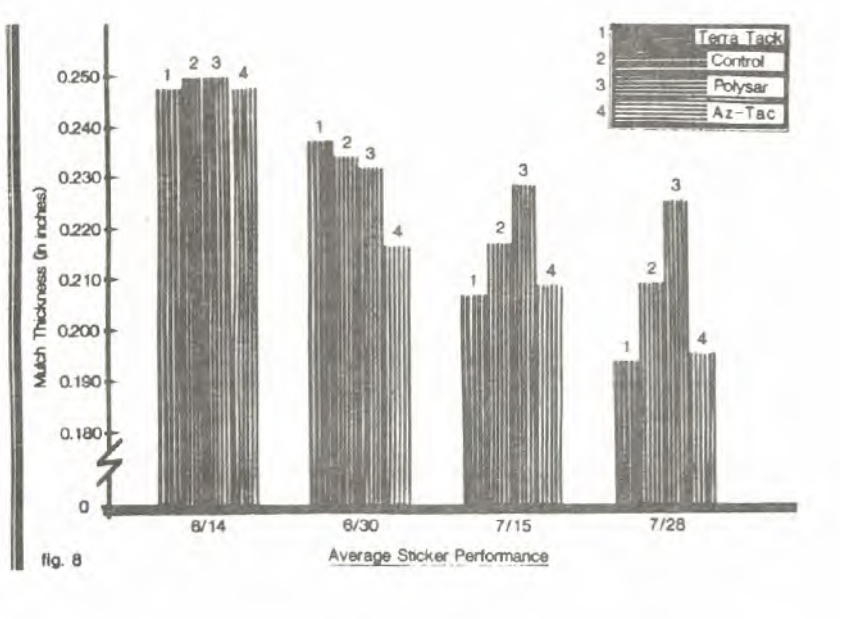

fig. 8

The excelsior mat is the only manufactured mulch used in this study and is very easy to apply. The other four mulches require several handling procedures which add to cost. Nursery managers can apply their own mulch cost but the excelsior mat would be approximately 18 cents per lineal foot of 4 foot wide nursery bed. Mulch cost incurred in 1984 for the loblolly pine seedbeds at Claridge Nursery using hardwood bark was approximately 2 cents per lineal foot of 4 foot wide nursery bed. This includes material, labor, and equipment cost.

Of the three stickers used in this study, Polysar was the easiest to mix and use. All three are mixed in water and equipment clean-up can be done with a thorough wash-down and flush out with water. Polysar is a liquid and must be protected from freezing when stored. The other two stickers (AzTac and Terra Tack) are powders and require protection from moisture when stored.

CONCLUSION

Mulches had an effect on initial germination of loblolly pine seed used in this study. Pine straw yielded the highest number of plantable seedlings and the second lowest cull per cent. Excelsior produced the

second highest number of plantable seedlings and the lowest cull per cent (Table 2). Average seedling size from these two mulches did not place as high in diameter or oven dry weight as with sawdust, pine bark, or grain straw. If pine straw was considred the standard performance level, then excelsior would be next best.

Although the study was not specifically designed to evaluate stickers, we can observe trends. The performance of these stickers to hold mulches in place can be judged by Figure 8. Polysar seems to stabilize the mulches best and maintain the most desirable mulch depth. It is the only sticker that continues to out perform the treatment with no sticker. The no sticker treatment can be considered normal nursery operation.

LITERATURE CITED

Bland, W. A. 1973. Study to evaluate effects and cost of mulching material in loblolly pine seedbeds. Forestry Notes No. 3, January 1973; N. C. Department of Natural Resources and Community Developement, Division of Forest Resources, Raleigh, N.C.

Oliveira, J. J. de; Bridi, G. L. 1976. Effects of needles, rice straw, and leaf mold on the germination and development of *Pinus taeda* seedlings. Revista do Centro de Ciencias Rurais (1976) 6(2) 197-201; University Federal de Santa Maria, R. S. Braxil.