

GROUND COVER SODS — AN ECONOMIC AND PRODUCTION POSSIBILITY?¹

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Abstract. A ground cover sod was produced experimentally in 12 to 16 weeks using *Euonymus fortunei* var. *colorata* Rehd., purple wintercreeper, or euonymus; *Hedera helix* L. English ivy; and *Pachysandra terminalis* Sieb. and Zucc. pachysandra. Of the 7 media examined, pine bark mulch, peat moss and perlite, and Metro Mix 300³ produced the most satisfactory sods. Both euonymus and English ivy became established with a minimum of effort. Costs to produce and install ground cover sod was approximately twice as high as the conventional method. High initial costs were at least partially compensated for by lower maintenance costs during the first year.

Ground covers are used extensively to soften lines and unify plantings in the landscape. They may reduce soil erosion, eliminate mowing and, under ideal conditions, reduce maintenance. Ground covers are tolerant of many conditions including moist or dry soils and high or low light conditions. Ground covers planted 9-12" on center may require one or more years to cover an area. During the establishment period increased maintenance costs may result from an invasion of weeds or soil erosion. Maintenance and establishment problems and the desire for a finished appearance may warrant the use of a ground cover sod in many landscapes.

The experiments examined three main areas: 1) The feasibility of producing a ground cover sod; 2) the ease of establishing a ground cover sod; and 3) a cost comparison of conventional and sod ground cover production and installation.

REVIEW OF LITERATURE

In 1973 the production of ground covers as a sod in a fiberglass mat with an asphalt paper backing was examined but their establishment was not successful. Research by Decker (1) on the production of grass as a sod showed that by using an impenetrable base the primary roots would rapidly grow together and bind the sod. A patent on his method is pending. Mitchell and Langston (4) investigated the use of plastic netting in sod production to allow for an earlier sale.

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An impenetrable base has also been used by other propagators in the nursery industry for several years to facilitate production. A plastic-covered case in which the plastic completely enclosed the medium was used by Harvey Gray to root *Tsuga canadensis* cuttings (2). Also, liners have been produced in polyethylene-lined peat pots thus preventing root penetration through the walls of the pot and reducing harvest cost and decreasing damage to the plant during harvesting and lining out (3, 5).

MATERIALS AND METHODS

The methods used to produce a ground cover sod were modified slightly in each of these experiments. By the conclusion of the last experiment, a general procedure of production was evident.

A 4-mil polyethylene sheet was sloped at approximately a 4° angle to insure adequate drainage (Fig. 1). A polyethylene net (5/8 x 3/4" mesh) was then placed on the polyethylene sheet and a layer of medium 1 inch thick was placed over the net. The cuttings were then stuck at 2 to 4" spacings and misted for 6 sec every 6 min. The frequency of misting was reduced as rooting occurred. Osmocote (18-9-13, 3-mon. release) was applied at a rate of 4 oz/bu of medium. A preventive spray program for fungus and insects was applied as required.

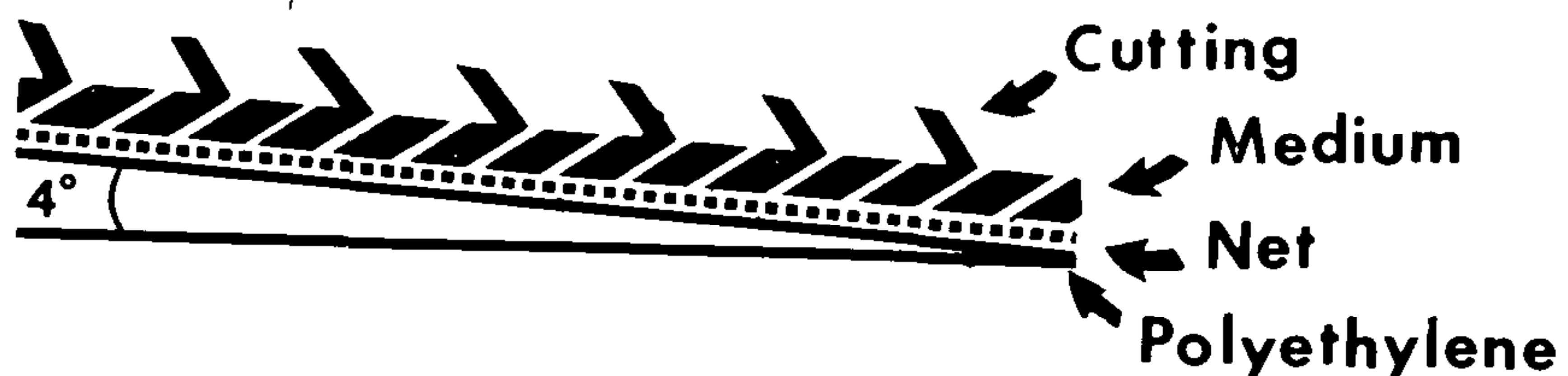


Figure 1. A diagrammatic sketch of the end view of a bed of ground cover sod. Sod is placed on a mist bed for propagation.

The first experiment examined the potential of English ivy, euonymus and pachysandra as a ground cover sod. Tip cuttings were stuck at 2 and 4" spacings in a 1" layer of peat moss: perlite medium (1:1 v/v). After 12 and 16 weeks 4" square samples of each sod at each density were taken. Dry weights of the roots and shoots contained in the 4" sample were then weighed.

The second study examined the effect of the medium on the production and transportability of a ground cover sod. English ivy was stuck at 3" spacings in each of 7 different media. The media used were pine bark mulch (1/8 - 1/4" screen size); uncomposted hardwood bark mulch; peat moss: perlite (1:1 v/v); Metro Mix 300; peat moss: Haydite:perlite (1:1:1 v/v/v); peat moss: Haydite (1:1 v/v); and peat moss:sand (1:1 v/v).

The plants after 20 weeks had formed a solid mat in all media and were transferred to a 34°F minimum heat house for overwintering. In May, 1975, one English ivy sod of each medium was shipped to each of 3 growers in Ohio. These growers evaluated the ground covers and then returned them for re-evaluation to the University. The evaluators were asked to rank each medium with the most appropriate rating on each of a series of questions using a scale of 1, unacceptable, to 5, excellent.

In the third experiment, the ease of establishing English ivy and euonymus ground cover sods was examined. A suitable sod of both was produced in pine bark mulch and peat:perlite (1:1 v/v) in 12 weeks and then planted in a test plot. A conventional planting using plants planted 9" on center with a 1" pine bark mulch was included. Half of the ground covers were planted in full sun and the other half in 47% shade. During the first 2 weeks of August, the ground covers were watered six times with 1" of water at each irrigation. Natural rainfall was sufficient thereafter.

To compare the costs it was calculated that 56 sq ft was required to plant 100 ground covers 9" on center. The cost of producing and installing this 56 sq ft was calculated using: 1) rooted cuttings, 2) 2¼" potted plants, and 3) ground cover sod which contained 625 plants 3" on center.

Material, labor and overhead costs of producing and installing each product were identified. Labor activity requirements were based on actual timing of activities at a wholesale ground cover producer, a landscape planting operation and simulations. Production labor was calculated at \$3.00/hr and installation labor was calculated at \$5.00/hr. Material costs were current in Columbus, Ohio as of October 1, 1975. Overhead expenses/sq ft/day were judged similar for both production techniques while overhead expenses for installation were not calculated because the two methods require approximately the same installation time, tools, and worker knowledge. Costs of production and installation were made without mark-up.

RESULTS AND DISCUSSION

The production of a ground cover sod is dependent on both the species and the density of the plants used. It was found that euonymus produced a larger shoot and root weight than the other plants. After 12 weeks of growth the roots of euonymus appeared to have sufficiently knit to hold the media at both 2 and 4" spacings. English ivy roots, after 12 weeks, at 2" spacing and generally at 4" spacing were sufficiently knit. After 16 weeks, pachysandra developed a more fibrous root system which produced a satisfactory sod at 2" spacings. At 16 weeks all of the sods of euonymus and English ivy were of satisfactory quality.

All evaluators ranked the media for ground covers in basically the same order (Table 1). Pine bark mulch, peat moss and perlite and Metro Mix in general produced the best ground cover sods with all means greater than 4 (good), all other media rated between 3 and 4 (satisfactory to good).

Table 1. Mean evaluation of English ivy sod as a product for landscape use.

Medium	Condition On arrival ^z	Overall Quality ^z	Success of Shipping ^z	Desirability in the Landscape ^z
Pine bark mulch	5.0a ^x	5.0a	5.0a	5.0a
Peat Perlite	4.7ab	4.7ab	4.0abc	4.3ab
Metro Mix	4.3ab	4.5ab	4.5ab	4.5ab
Peat Haydite Perlite	4.0bc	4.0abc	3.7bc	4.3ab
Peat Haydite	4.0bc	3.3c	3.0c	3.8ab
Peat Sand	3.8bc	3.8bc	3.3bc	4.2ab
Uncomposted hardwood bark	3.3c	3.0c	3.3bc	3.7b

^zResponse key — 1 = unacceptable, 2 = poor, 3 = satisfactory, 4 = good, 5 = excellent.

^xMeans separation within column by Duncan Multiple Range Test, 10% level.

Sods grown in pine bark mulch, peat moss and perlite, and Metro Mix arrived in the best condition, rated high in overall quality, and were judged the best for shipping. The media containing Haydite and sand were, perhaps, too heavy for easy shipping. Sods grown in uncomposted hardwood bark lacked the deep green foliage color characteristic of the other media. All of the ground cover sods were judged acceptable as a product for landscape use.

Ten weeks after transplanting in the field, there was a 98% survival of the plants in sun, and 100% in shade. In all treatments the roots of the sod-like ground covers had grown into the soil. In this test, it was observed that a ground cover sod may suppress a weed population. This is probably the result of increased competition due to the complete foliar cover of the ground cover sods in combination with the mulching properties of the growing media which were used.

To produce 1 flat of 100 rooted cuttings the cost was estimated at \$4.61 (Table 2). It cost \$9.79 to produce 100 2¼" pot plants while it cost \$28.94 to produce 56 sq ft of ground cover sod. Of this sum \$11.67 is attributed to the cost of the 625 cuttings and \$8.23 is due to an increased overhead resulting from a proportionate increase in the required production area. Installation of 100 conventional plants 9" on center in an area 56 sq ft was estimated to cost \$13.94 in labor and material. Labor and material to install 56 sq ft of ground cover sod was estimated to cost \$7.79. Higher costs to install conventional plantings are due to costs of mulch and increased planting time.

In examining the total cost of each method the cost of producing and installing 56 sq ft of ground cover sod (\$36.73) is 98% higher

than conventionally planting 100 rooted cuttings (\$18.55) and 55% higher than 100 potted plants (\$23.73). However, a square yard of a conventional planting contains approximately 20 plants 9" on center and, in a square yard of a ground cover sod, there are approximately 120 plants.

Table 2. The estimated cost of producing and installing 100 conventional ground covers and 56 sq ft of ground cover sod.

Item	Production				Installation			Grand Total
	Labor	Material	Over head	Total	Labor	Material	Total	
100 rooted cuttings 1 flat	\$1.26	\$3.11	\$0.24	\$4.61	\$4.71	\$9.23	\$13.94	\$18.55
100 2¼" pot plants 2 flats	4.00	5.31	0.48	9.79	4.71	9.23	13.94	23.73
5.25 sq m ground cover sod	5.25	15.36	8.23	28.94	3.72	4.07	7.79	36.73

CONCLUSION

For many landscape situations the additional cost of a ground cover sod may be worth the investment. The use of a ground cover sod will give a planting an immediate finished appearance and may also prevent soil erosion and reduce mulching and maintenance requirements.

For many of today's consumer's such an effect is often desired. Corporations, small businesses, condominiums, highways, and many homeowners could utilize a ground cover sod. They would use it because it would provide an immediate established appearance and perhaps eliminate some of the problems associated with the initial establishment and maintenance of a conventional ground cover planting.

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