

PLANT RESPONSES TO SAWDUST

DELZIE DEMAREE, Stanford University, California

Sprouting seeds in sawdust has been a common practice in botanical laboratories for many years. A failure to get good root development in *Vicia faba* L. in sawdust of unknown source initiated the following preliminary experiment: a number of seeds were planted in fresh sawdust from *Quercus alba* L. and *Fagus grandifolia* Ehrh. In *Quercus* the roots were brown and did not penetrate the sawdust more than two centimeters, while in the *Fagus* sawdust the roots were well developed, white and contained hairs. The above experiment indicates that root development may depend on the kind of sawdust used.

An experiment was performed with sawdust from thirty-two species of Indiana woody plants, in *Swietenia mahagoni* Jacq., *Tsuga heterophylla* (Raf.) Sarg., and *Pseudotsuga taxifolia* (Lam.) Britton. With the exception of the last three species, the sawdust was made from specimens between fifteen and twenty centimeters in diameter. The same saw was used in order to have the sawdust of the same texture. Eight of the following plants were grown in each kind of sawdust:

Zea mays L.
Helianthus annuus L.
Ipomoea purpurea Roth
Lycopersicum esculentum Mill
Cucurbita pepo L.
Pisum sativum L. (early Alaskan variety)
Triticum aestivum L.
Phaseolus multiflorus Willd.

All plants were grown in containers of the same size, in a greenhouse where the temperature was about 70° F. These plants, sixty-four in each kind of sawdust, were grown for three weeks from the time they emerged. The tops were measured in centimeters, the average for the sixty-four being shown in column one of the following table. The tap and lateral roots were measured in centimeters; the average for the sixty-four plants is shown in column two; column three shows the sum of the average stem and roots. It is evident from this table that for the sixty-four plants *Aesculus* sawdust gives four times the stem growth that *Quercus alba* gives, and over thirty times the root growth. Sawdust from *Aesculus*, *Ostrya*, *Gleditsia* and *Cornus* gave better results than did a sandy loam soil.

In the individual experiments, *Phaseolus* in *Ulmus* sawdust made the best root growth, with an average of 647 cm., followed by *Zea* in *Aesculus*, 504 cm., *Pisum* in *Aesculus*, 287 cm., *Cucurbita* in *Acer sac-*

charum, 180 cm., *Helianthus* in *Aesculus*, 171 cm., *Ipomea* in *Aesculus*, 165 cm., *Triticum* in *Morus*, 145 cm., and *Lycopersicum*, in soil, 40 cm.

The peas produced excellent nodules in *Aesculus*. Root hair development was very poor in most kinds of sawdust, especially in *Quercus*. The scarlet runner bean, in six weeks, produced fruit when growing in *Amelanchier* sawdust.

The results which are reported may throw light on the great differences experienced by farmers of Ripley County, Indiana, who have used sawdust on cultivated land, especially so where mills cut only one variety of sawdust—one cutting oak, another beech or maple, sweet gum, elm or basswood, as the case might be.

	Average height of 64 plants, in cm.	Average root system of all plants in cm.	Average plant: sum of root and stem in cm.
<i>Aesculus glabra</i> Willd.	26.6	257.8	284.4
<i>Ostrya virginiana</i> (Mill) K. Koch	29.6	159.4	189.0
<i>Gleditsia tricanthos</i> L.	26.3	162.1	188.4
<i>Cornus florida</i> L.	24.9	163.0	187.9
Soil—sandy loam.	37.2	140.0	177.2
<i>Liquidambar styraciflua</i> L.	26.0	144.9	170.9
<i>Pyrus malus</i> L.	23.1	146.5	169.6
<i>Morus rubra</i> L.	25.6	139.8	165.4
<i>Platanus occidentalis</i> L.	28.3	136.4	164.7
<i>Asimina triloba</i> (L.) Dunal.	18.9	140.1	159.0
<i>Ulmus americana</i> L.	27.5	123.8	151.3
<i>Carpinus caroliniana</i> Walt.	22.5	106.3	128.8
<i>Tilia americana</i> L.	25.6	103.0	128.6
<i>Juglans nigra</i> L.	20.1	91.8	111.9
<i>Pinus strobus</i> L.	21.2	90.7	111.9
<i>Swietenia mahogoni</i> Jacq.	24.2	87.4	111.6
<i>Acer saccharum</i> L.	27.1	78.7	105.8
<i>Vitis labrusca</i> L.	20.6	83.7	104.3
<i>Fraxinus americana</i> L.	27.2	74.0	101.2
<i>Betula lutea</i> Michx.	22.1	73.4	95.5
<i>Acer rubrum</i> L.	23.1	70.1	93.2
<i>Amelanchier canadensis</i> (L.) Medic.	33.3	56.1	89.4
<i>Fagus grandifolia</i> Ehrh.	18.3	68.0	86.3
<i>Liriodendron tulipifera</i> L.	22.5	63.5	86.0
<i>Nyssa sylvatica</i> Marsh.	26.1	57.7	83.8
<i>Salix nigra</i> Marsh.	25.8	54.3	80.1
<i>Alnus incana</i> (L.) Moench.	24.5	54.3	78.8
<i>Sassafras variifolium</i> (Salisb.) Ktze.	23.7	51.2	74.9
<i>Prunus serotina</i> Ehrh.	23.4	50.6	74.0
<i>Tsuga heterophylla</i> (Raf.) Sarg.	18.0	50.9	64.9
<i>Populus tremuloides</i> Michx.	28.6	37.4	66.0
<i>Carya ovata</i> (Mill) K. Koch.	27.0	36.9	63.9
<i>Juniperus virginiana</i> L.	17.9	37.3	55.2
<i>Pseudotsuga taxifolia</i> (Lam.) Britton.	13.8	41.1	54.9
<i>Quercus velutina</i> Lam.	15.3	25.2	40.5
<i>Quercus alba</i> L.	7.9	8.1	16.0