EFFECT OF VARIOUS TREATMENTS ON GERMINATION OF PECAN SEED

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Pecan *(Carya illinoensis* (Wangenh.) K. Koch.), often called sweet pecan, is an important source of valuable wood and a very desirable wildlife food. Since this species usually does not form pure stands, and its natural regeneration consists mainly of scattered individuals, establishment of stands for management would require an artificial regeneration by direct seeding or planting of seedlings.

Nuts that fall in October or November rarely germinate before late April. This long period between seedfall and germination exposes the nuts to animal predation and rot. Various preplanting treatments to break seed dormancy have been recommended. The method most widely used is stratification in sand, peat, or loamy soil at 35-45° F. for 30-90 days (Anonymous 1948, Gossard and Crane 1946). McHatton and Woodruff (1926) reported that soaking the nuts for as much as 20 seconds in concentrated H_2SO_4 seriously impaired seedling growth. Soaking in NaOH and NH_4OH from 1 to 10 minutes sometimes improved germination, as- did exposure to NH_4OH fumes for 24 to 96 hours. In the same study, hot water soakings impaired or prevented germination; nuts exposed to fumes of nitric acid were killed.

This experiment explored the effect of various chemical treatments upon germination of stratified and unstratified pecan nuts.

Procedure

Nuts collected in central east Texas at the end of November were stratified in moist peat at 35° F.45° F; an equal quantity was stored in a paper bag at room temperature. After 53 days both lots were divided into 20-nut batches. One stratified and one unstratified batch of nuts were soaked for 24 hours in each of the following solutions:

1. Distilled water
2. Gibberellic acid (I gr. 85 percent GA/liter)
3. Gibrel (I gr. 3.5 percent potassium gibberellate/liter)
4. Magnesium chloride (30 gr./liter)
5. Potassium nitrate (10 gr./liter)
6. Potassium permanganate (0.01 gr./liter)

After soaking, the nuts were rinsed with tap water and placed in petri dishes in a germinator at 85° F. Germination was observed daily for 25 days. A nut was considered germinated when the emerging radical protruded at least 0.5 cm.

After 25 days, *total germination percentage, mean daily germination percentage,* and Czabator's (1962) *peak values* [2] were computed. *Germination value,* which is the composite expression of both speed and completeness of germination, was then computed by multiplying peak value by mean daily germination. These values for individual treatments are presented in table 1.

Results and Discussion

Statistical analysis of data (table 1) did not reveal any significant effect of the chemical treat-

TABLE 1.—*The effect of six treatments upon germination of stratified and unstratified pecan nuts*

Treatment	Total percent germination	Peak value	Mean daily germination	Germination value
Unstratified:				
H_2O	95	5.38	3.80	20.44
KGA	100	6.07	4.00	24.28
GA	80	5.00	3.20	16.00
$MgCl_2$	90	5.36	3.60	19.30
KNO_3	95	6.07	3.80	23.07
$KMnO_4$	60	3.57	2.40	8.57
Mean	87	5.24	3.47	18.61
Stratified:				
H_2O	100	12.86	4.00	51.44
KGA	100	18.00	4.00	72.00
GA	100	12.50	4.00	50.00
$MgCl_2$	100	16.67	4.00	66.68
KNO_3	80	14.00	3.20	44.80
$KMnO_4$	100	14.00	4.00	56.00
Mean	97	14.67	3.87	56.82

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[2] Peak value is the largest of the quotients derived by dividing cumulative germination percent on each day by the number of days to reach this percent.

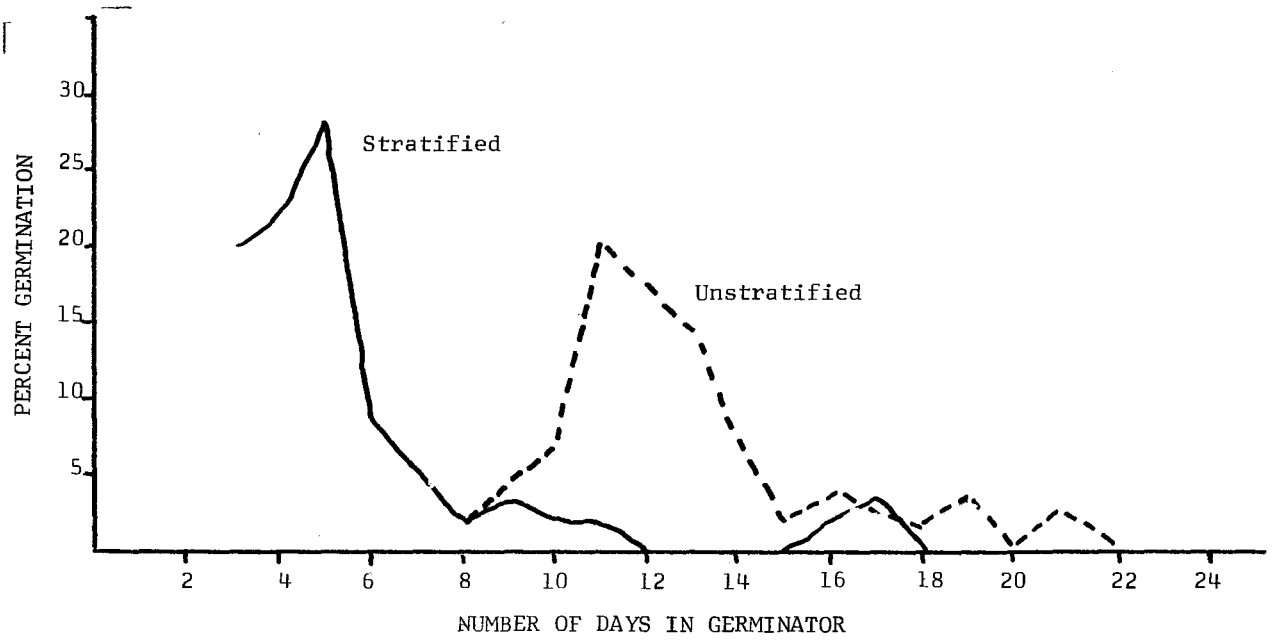

Figure 1.—Daily rate of germination of stratified and unstratified pecan nuts.

ments on germination indices of stratified and unstratified nuts combined. There was some indication that potassium permanganate reduced germination of unstratified nuts, but the statistical design did not provide for separate analyses of stratified and unstratified lots.

Stratification did not significantly affect *total germination percentage* or the *mean daily germination percentage,* but it highly significantly increased the *mean peak value* and, consequently, the *mean germination value.* Stratification speeded germination, stratified batches reaching their highest rate 6 days earlier than the unstratified (fig. 1) . McHatton and Woodruff (1926) reported that stratified and refrigerated pecan nuts germinated more rapidly than those stored under other conditions. Gossard and Crane (1946) concluded that pecan nuts can be held in sheds or even heated rooms from time of harvest until early May without serious loss of viability. The present study tends to confirm this, since germination of room-stored nuts was 87 percent, as compared with 97 percent for those that were stratified.

The authors conclude that, until better methods are developed, stratification is the only dependable method to speed up germination of sweet pecan. Use of stratified nuts for planting should reduce the time they are exposed to predation by about half. Where facilities for stratification are not available, overwintering of nuts at room temperature is not likely to result in significant decrease of viability.

Literature Cited

Anonymous.
1948. Woody-plant seed manual. U.S. Dep. Agr. Misc. Publ. No. 654.

Czabator, F. J.
1962. Germination value: an index combining speed and completeness of pine seed germination. Forest Sci. 8: 386-396.

Gossard, A. C., and Crane, H. L.
1946. Germination of pecan nuts. North. Nut Growers Assoc. Ann. Rep. 46: 84-89.

McHatton, T. H., and Woodruff, J. G.
1926. Some factors influencing pecan germination. Amer. Soc. Hort. Sci. 24: 125-129.