

The Response of Honduras Pine to Various Photoperiods

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SUMMARY

Height growth of Honduras pine (*P. caribaea v. hondurensis*) seedlings is shown to be significantly influenced by photoperiod. Maximum initial effect was obtained by the longest period tested, 16 hours; but by 7 weeks, greatest growth was obtained by an interrupted 11 (8+3) hours.

RESUMEN

El crecimiento en altura de arbolitos de pino hondureño (*P. caribaea v. hondurensis*) se demostró significativamente influenciado por fotoperiodo. Se obtuvo un efecto inicial máximo durante el período más largo de prueba, 16 horas; pero a las 7 semanas se obtuvo un mayor crecimiento durante un período de 11 horas interrumpidas (8+3).

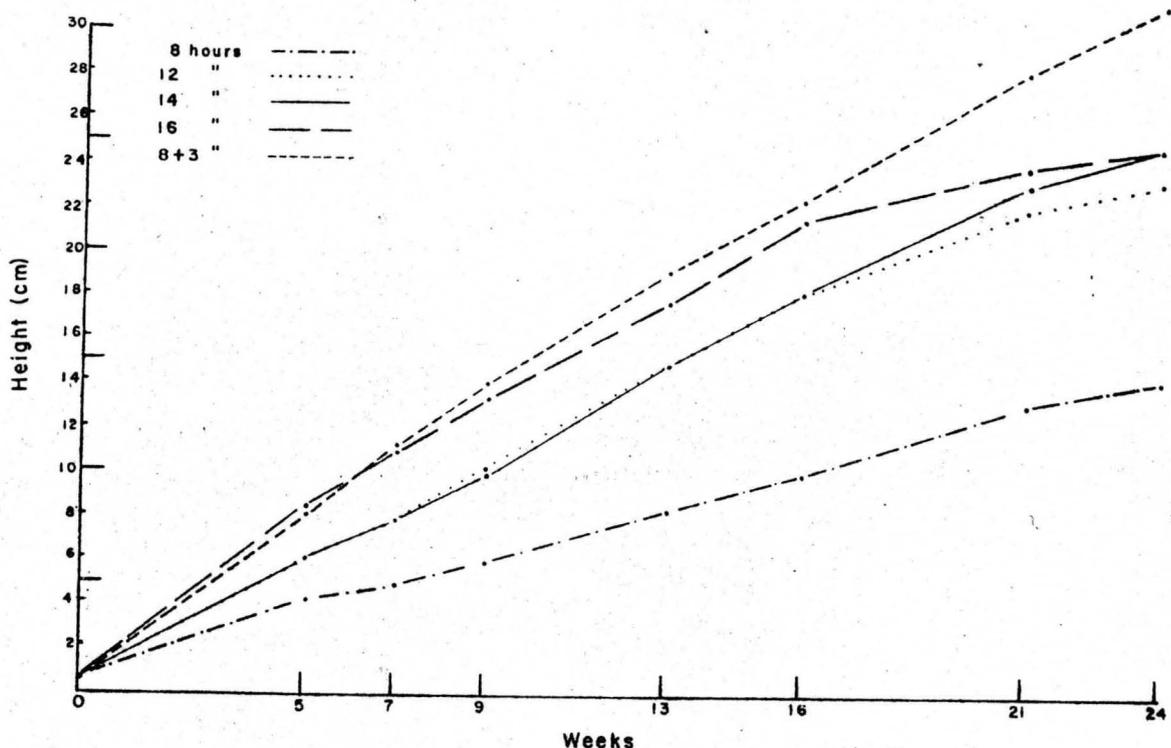


Figure 1. Variation in stem length of *Pinus caribaea v. hondurensis* with daily photoperiods; means of groups of 15 seedlings.

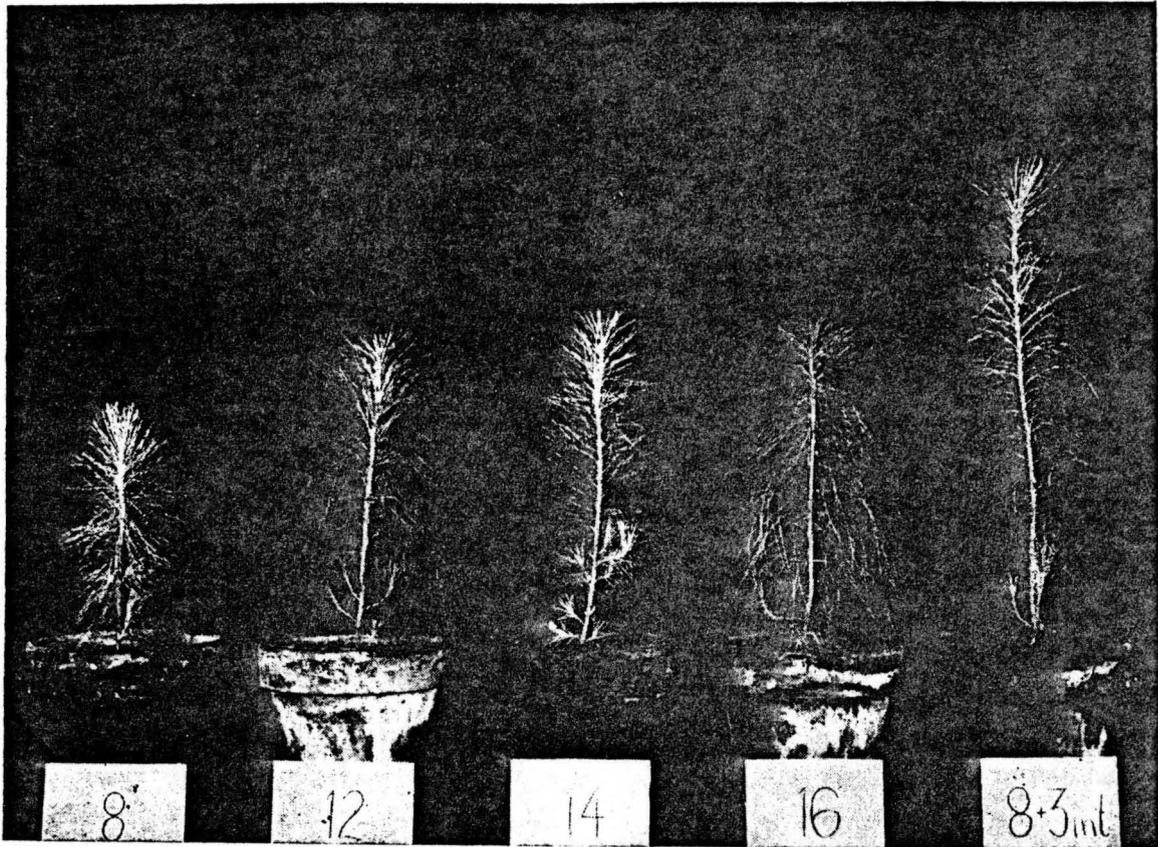


Figure 2. Comparative heights of Caribbean pine after 30 weeks exposure to 5 different photoperiods. Note that 8-hour day seedling is shorter than the 12-, 14-, and 16-hour seedlings which are shorter than the seedling with 11 hours interrupted light.

Growth and development of Honduras pine (*Pinus caribaea* v. *hondurensis*) exposed to various photoperiods were observed in a study at Beltsville, Maryland, with seed obtained from British Honduras. Approximately 2 months after germination, the seedlings were divided into 5 groups, with the average height of the seedlings approximately the same in each group, Figure 1. Each group was exposed to one of five photoperiods: 8, 12, 14, 16, and 11 hours per day. The 11-hour seedlings received light in two separate periods, as explained below.

Each group of pines was placed on a greenhouse truck for transporting into and out of its appropriate photoperiod chamber.^{1/}

The 8-hour seedlings were moved into the greenhouse at 8 a.m. and into a dark chamber at 4 p.m. Also at 4 p.m., the 12-hour trucks were wheeled into a chamber illuminated by incandescent bulbs (Downs, Borhwick, and Piringer; 1958) and left to 8 p.m.; the 14-hour seedlings were left under incandescent lights until 10 p.m., the 16-hour seedlings to midnight, and the interrupted-light seedlings were in the illuminated chamber from 11 p.m. to 2 a.m. The light intensity within the chambers was 40 footcandles and the minimum temperature was 70°F.

The general effect on Honduras pine of extended photoperiod was to increase both

^{1/} Photoperiod facilities were provided by R. J. Downs, Plant Physiology Pioneering Research Laboratory, U.S.D.A. Agriculture Research Service, Beltsville, Maryland.

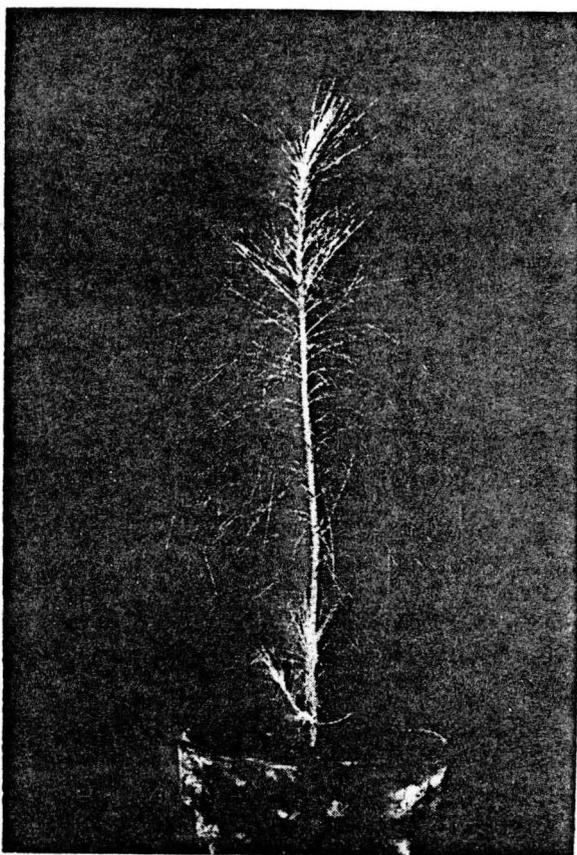


Figure 3. Continuous acicular growth and stem elongation of Caribbean pine. This response was common to all photoperiods.

height growth and production of new needles, Figure 2.

During the first five weeks of treatment height growth for the 16-hour and interrupted 11-hour days were greater than for 12 or 14 hours; these latter were, in turn, greater than for 8 hours. Both differences were significant at the 1 per cent level of confidence.

At the end of 24 weeks the pattern had changed slightly. Growth for the interrupted

11 hours was significantly greater than for 12, 14, or 16 hours, all of which were highly significantly greater than for 8 hours.

Although it is interesting to speculate as to whether this shift in pattern was accidental or characteristic, and if characteristic why it occurred, the study provides no apparent basis for analysis.

It is interesting that there was continuous needle production at all photoperiodic treatments, Figure 3. This is in contrast to *Pinus sylvestris* L. which produced typical nodular growth at 8-, 12-, and 16-hour days but at 14-hour days gave the same continuous acicular growth pattern as Honduras pine (Downs and Borthwick, 1956). According to Downs and Piringner (1958) the number of fascicles on the juvenile stem is controlled by photoperiod.

Other growth habits included very little lateral branching, chlorosis (possibly attributable to excessive watering), occasional formation of terminal buds after thirty weeks, no lateral buds, and frequent curled, unelongated fascicles which did not always rupture the fascicular sheaths.

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