

DEVELOPMENT OF DRYING SCHEDULES FOR RUBBER AND PINE TIMBER FOR THE DEHUMIDIFICATION KILN DRYING

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Most of the timber in Sri Lanka is used in unseasoned state or seasoned using conventional kilns which use fuel wood boilers or open fires as a heating source. A study has been conducted to introduce dehumidification drying kiln, which is easy to fabricate and consumes less energy hence ideal for small scale timber industries.

Experiments were conducted to investigate drying behaviour, to develop kiln schedules and to evaluate the developed kiln schedules for Pine (*Pinus caribaea*) and Rubber (*Hevea brasiliensis*) timber. The dehumidification kiln used in the present study is locally fabricated and it has 25 cubic feet capacity. The temperature of the kiln can be increased to 50°C and relative humidity can be reduced to 16%.

Drying rate, percentage shrinkage and drying defects were observed for these two species by drying 215x75x300 mm stakes in temperature, humidity and air circulation controlled mini chamber. It was found that *Pinus caribaea* was relatively fast drying timber compared with *Hevea brasiliensis*. However, *H. brasiliensis* showed higher percentage shrinkage and defects over *P. caribaea* during the early stages of drying. This indicates that *H. brasiliensis* should be dried slowly at the initial stages of drying.

Three kiln schedules with slow, medium and fast drying rates were developed for seasoning 25 mm planks based on the results of drying behaviour. Drying rate, drying efficiency, drying defects, drying cost and thermal efficiency of these kiln schedules were evaluated by drying 25x150x1000 mm sample boards in the dehumidification kiln. Compared with conventional kiln seasoning, dehumidification kiln seasoning gave higher quality dried timber with more than 90% drying efficiency and faster drying rate, while maintaining higher thermal and economical efficiency.

It is concluded that higher quality *H. brasiliensis* and *P. caribaea* dried timber can be obtained at a faster rate by drying them using these schedules in the dehumidification drying kiln compared with conventional drying.