

# Chemical Stains In Hackberry Can Be Prevented

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Several methods are available that could be used to prevent the unsightly grey-brown chemical stain that develops in hackberry and other hardwoods before drying is completed.

Primary manufacturers have been justifiably hesitant to process stain-susceptible species such as hackberry, soft maple, hickory, red oak, and other hardwoods. They are aware that because the surface fibers dry faster and do not stain, interior stain will not show up until machining exposes the fibers. When they have processed these species, it has usually been through a speeded-up drying schedule, which in turn throws other schedules out of kilter.

Scheffer and Chapman (1934) and Clark (1957) suggest that a 15- to 60-minute preseasoning steaming or heating treatment may prevent stains in some species. Also, immediate kiln drying by current kiln schedules or with higher initial temperature schedules is often suggested as a means to alleviate stains. The effectiveness of these treatments in the prevention of stain in hackberry was investigated.

Hackberry logs cut in central Louisiana in October were processed into 2½-inch squares 24 inches long. The seven drying treatments were started about 24 hours after the trees were felled. Nine sapwood specimens were

dried under each treatment:

1. Atmospheric steaming (212°F) for 30 minutes, then air seasoning.
2. Atmospheric steaming (212°F) for 60 minutes, then air seasoning.
3. Heating in an oven at 212°F for 30 minutes, then air seasoning.
4. Heating in an oven at 212°F for 60 minutes, then air seasoning.
5. Air seasoning.
6. Conventional drying schedule.
7. Drying schedule with initial 155°F dry bulb.

In an attempt to initiate the stain, air seasoning schedules in treatments 1 through 5 consisted of 82°F dry bulb and a controlled relative humidity schedule of 86 per cent for two

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13

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Moisture content at start of step Percent	Conventional Schedule		Relative humidity -----Percent-----	Equilibrium moisture content
	Dry bulb -----°F-----	Wet bulb		
Above 40	120	113	80	14.1
40	120	110	72	12.1
35	120	105	60	9.7
30	130	105	43	6.8
25	140	100	25	4.1
20	150	100	8	2.9
15	180	130	26	3.3

#### 155° Schedule

Above 40	155	149	86	14.4
40	155	146	78	12.3
35	155	141	68	9.8
30	155	130	49	6.9
25	155	115	29	4.2
20	155	105	23	3.2
15	180	130	26	3.3

weeks, then 50 per cent RH. The two kiln-drying schedules (treatment 6 and 7) consisted of the following:

For the 155° schedule, the wet bulb temperatures were selected to obtain similar equilibrium moisture contents as the conventional schedule.

After one week of treatment, the specimens were inspected and the per cent of stained area on an exposed end was estimated. Five of nine air-seasoned specimens had visible stain

covering about 30 per cent of the cross sectional area. Specimens heated in air showed a smaller percentage of stained area on fewer specimens—averaging 25 per cent coverage on four specimens heated for 30 minutes and 10 per cent coverage on two specimens heated 60 minutes. No stain was evident at this time on steamed specimens or specimens immediately kiln dried. However, the squares dried at the higher kiln temperature did show some mold on a few pieces. The mold

probably resulted from inadequate air circulation or non-uniform humidity conditions in the drying chamber. After two weeks no major changes were observed.

After eight weeks of air seasoning or kiln drying, the assumption was that the moisture content of all specimens was low enough to prohibit additional staining. Therefore, conditioning was halted and specimens centerline ripped. Exposed surfaces were inspected and per cent of stained area estimated.

Inspectors found that no treatment caused end or surface drying checks and that the air-dried specimens stained the most (Table 1, Figure 1). Steaming for 60 minutes before air drying, and drying by a conventional kiln schedule without steaming were considered effective in preventing staining.

The most effective method for preventing staining was atmospheric steaming for 60 minutes. Also considered effective were steaming for 60 minutes before air-drying, and drying by a conventional kiln schedule without steaming. Also, a shorter 30-minute steaming cycle was considerably more effective in stain prevention than air seasoning. The high (155°F) kiln scheduled was about as effective as the 30 minute atmospheric steaming treatment. A 30-minute initial heating cycle prior to air seasoning apparently had no benefit. The 60-minute preheating cycle, compared with the air seasoning treatment, decreased the stain percentage from 47 per cent to 23 per cent. However, all preheated specimens exhibited some degree of stain.

Based on this data, stain-free hackberry board can be dried successfully by conventional kiln-drying schedules or short steam cycles prior to air-drying. However, the material must be procured and the drying regime rapidly initiated to prevent stain.

#### LITERATURE CITED

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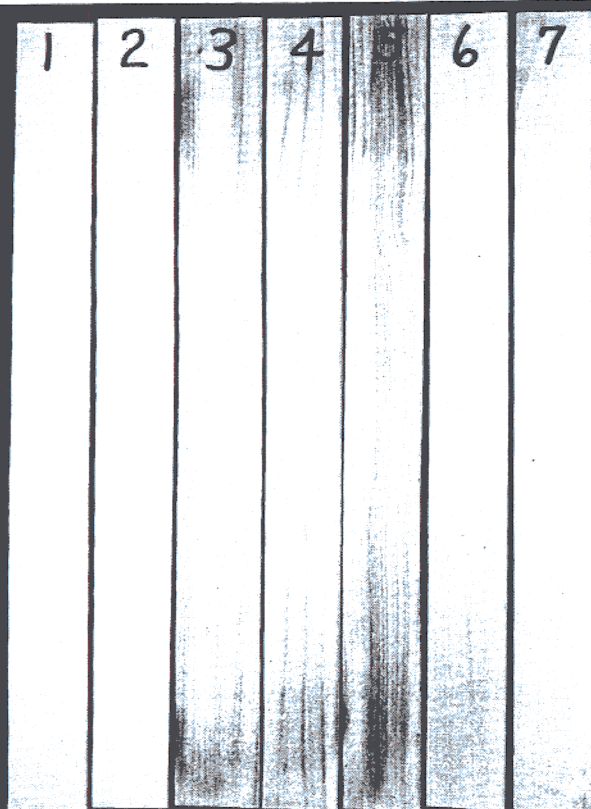


FIGURE 1.—Ripped surfaces of hackberry specimens dried with different treatments: (1) 30 minutes of atmospheric steam, then air-seasoning; (2) 60 minutes of atmospheric steam, then air-seasoning; (3) 30 minutes of heating (212°F), then air-seasoning; (4) 60 minutes of heating (212°F), then air seasoning; (5) air-seasoning; (6) conventional kiln schedule; and (7) kiln schedule with 155°F dry bulb.

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**TABLE 1.**—*Moisture content and visual inspection analysis of stain of hackberry specimens dried under various regimes.*

Treatment	Final	Stained specimens	
	moisture content	Number <sup>1</sup>	Area
	Per cent		Per cent
1. Atmospheric steam for 30 minutes	10.5	5	9
2. Atmospheric steam for 60 minutes	11.1	0	0
3. Heating (212°) for 30 minutes	11.0	9	42
4. Heating (212°) for 60 minutes	11.4	9	23
5. Air seasoning only	11.6	2	47
6. Conventional kiln drying	7.9	2	4
7. Kiln drying with 155°F initial dry bulb	12.5	9 <sup>2</sup>	7 <sup>2</sup>

<sup>1</sup>Each treatment had only nine specimens.

<sup>2</sup>A light green mold was present and may have influenced the stain appearance.