

## WEATHERING EFFECTS ON FINISHING PROPERTIES OF LOW VALUE WOOD SPECIES FROM AJK-I

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### ABSTRACT

The current study was carried out during 2009-10 to find the effects of weather on protected and unprotected wood samples of four low value wood species i.e. *Ailanthus* sp., *Sapindus mukorossi*, *Cedrela toona* and *Ficus palmata* collected from Azad Jammu and Kashmir(AJK). For this purpose wooden plates of 14"x7"x3/4" sizes were prepared from each species and partitioned into two portions i.e. uncoated and coated. The coating was done with commonly used five finishes (Lacquer, Varnish, Wax polish, Spirit polish and Linseed oil) in wood woodworking. Wooden plates were kept for one year in outdoor natural climatic conditions and data of climatic factors and wood weathering was recorded. Results revealed that all the finishes gave good protection to wood species against natural weathering when compared with uncoated area. The maximum natural and induced weathering resistance was observed in *Cedrela toona* and *Ficus palmata*.

### INTRODUCTION

*Weathering* is the slow degradation of materials exposed to the weather. The degradation mechanism depends on the type of material, but the cause is a combination of factors found in nature: moisture, sunlight, heat/cold, chemicals, abrasion by windblown materials, and biological agents (Makoto, 1997; William, 2005). Wood exposed to weather undergoes degradation (photo- degradation and photo-oxidation) due principally to the effect of light and water. The ultra-violet light component of sun's rays is thought to have the major effect on wood by depolymerizing lignin in the cell wall. Consequently the decomposed lignin leads to the deterioration of physical, chemical and biological properties of wood. Furthermore, water such as rain, humidity etc. accelerate the occurrence of checking, cracking, splits and roughness of exposed wood (Feist, 1984; Sudiynani *et al.*, 1996). The first step to prevent weathering is to block the sunlight. Finishes differ in their ability to protect wood from the sun and semitransparent ones next to paints are considered the best way to block sunlight, followed by water- repellent preservatives, especially those that contain ultraviolet (UV) light inhibitors (William, 1994).

In connection with the research work carried on anatomical, physico-mechanical, composite wood and pulp and paper properties of the mentioned wood species collected from AJK, the current study was conducted to evaluate the weathering effects on finishing properties of these species under natural climatic conditions.

### MATERIALS AND METHODS

Four wood species i.e. *Ailanthus* sp., *Sapindus mukorossi*, *Cedrela toona* and *Ficus palmata* were collected during 2009-10 from Azad Jammu and Kashmir, Pakistan. After proper seasoning, wooden plates (three of each) of 14"x7"x3/4" sizes were made. On plane and smooth surface five finishes i.e. Lacquer, Wax polish, Varnish, Spirit polish (French polish) and Linseed oil were applied on half portions without staining or

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bleaching the wood samples. Wooden plates were placed outdoor at an angle of 45° facing south for one year duration under natural climatic conditions. After one year the data regarding climatic conditions and wood weathering i.e. surface cracks and splits (mm) were recorded and tabulated.

## RESULTS AND DISCUSSION

### Climatic conditions

Climatic data for the exposure period was obtained from Watershed Management Branch, Pakistan Forest Institute, Peshawar (PFI) which is represented as under:

Table1. Climatic data during the period of experiment

S.No	Months	Minimum temperature (C°)	Maximum temperature (C°)	Relative humidity (%)	Rains	
					No. of days	Total mm
1	August, 2009	29.72	37.58	76.70	2	39.00
2	September, 2009	23.92	47.35	65.60	3	16.30
3	October, 2009	16.63	34.3	68.01	0	0
4	November, 2009	11.40	26.92	79.56	2	8.00
5	December, 2009	7.45	22.72	78.19	1	1.00
6	January, 2010	6.43	23.00	76.60	1	12.00
7	February, 2010	9.12	22.30	72.60	8	46.00
8	March, 2010	15.51	30.87	58.22	1	3.00
9	April, 2010	20.20	35.20	40.60	2	46.00
10	May, 2010	23.45	38.90	41.03	3	12.70
11	June, 2010	27.53	39.53	46.16	2	17.50
12	July, 2010	29.65	36.20	59.20	5	48.30
13	August, 2010	30.45	35.22	80.40	8	116.00

Source: PFI Meteorological Observatory

### Weathering effects on finished wood species

Results in the given Table 2 evinced that all the five finishes applied to wooden plates of four species provided protection against natural weathering when compared with uncoated area. In case of *Ailanthus* sp., the maximum protection among these finishes was offered by Linseed oil where only 0.55 % coated area was affected by surface cracks and splits while Varnish gave minimum protection having affected area of 4.89 %. The maximum difference between coated and uncoated area in this species was calculated 5.52%. *Sapindus mukorossi* on the contrary, showed results where Varnish was found the best polish among all five. It showed that Varnish consolidated the wood surface best against degradation process in this species.

Table 2. Surface performance of four wood species untreated and treated with five finishes against natural weathering (1-year data)

Treatments	<i>Ailanthus sp.</i>				<i>Sapindus mukorossi</i>				<i>Cedrela toona</i>				<i>Ficus palmata</i>			
	Cracks + splits area (%)		Differences (uncoated-coated)	Weathering Index*	Cracks+splits area (%)		Differences (coated-uncoated)	Weathering Index	Cracks+splits area (%)		Differences (coated-uncoated)	Weathering Index	Cracks+splits area (%)		Differences (coated-uncoated)	Weathering Index
	Uncoated	coated			Uncoated	coated			Uncoated	coated			Uncoated	coated		
Lacquer	2.63	3.44	1		1.69	2.33	1		0.58	1.16	1		0.80	1.68	1	
Varnish	4.89	1.18	1		0.91	3.11	1		0	1.74	0		0	2.48	0	
Wax polish	6.07	1.74	4.33	1	4.02	1.78	2.24	1	1.74	0	1.74	0	2.48	0	2.48	0
Spirit polish	1.80	4.27	1		3.15	0.87	1		0	1.74	0		0.55	1.93	1	
Linseed oil	0.55	5.52	1		2.83	1.19	1		0.45	1.29	1		0	2.48	0	

\* Sum of cracks and splits: 0=No cracking or splits, 1=Occurred at 1-10%of surface area (Source: Sudiyanni *et al.*, 1996)

In both *Cedrela toona* and *Ficus palmata*, natural and induced resistance to degradation was observed nearly in the same pattern where Varnish, Wax polish, Spirit polish and Linseed oil represented hundred percent protections against cracking and splits. Furthermore, among four species, *Ailanthus* showed maximum of 6.07% uncoated area weathered by cracks and splits and the weathering index rating among the species was found 0 to 1, which showed that in both coated and uncoated portions the affected areas did not exceeded 10 % of the total.

The weathering assessment for given four species indicated that all finishes play a vital role against photo-degradation and photo-oxidation when applied to wooden plates of these species. *Cedrela toona* and *Ficus palmata* both represented excellent resistance under natural and induced conditions against weathering probably due to the wood extractives in these species which act as antioxidants (Pascal, 2006).

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