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Natural resistance of selected South-East Asian wood species against *Gloeophyllum sepiarium* (Wulf. Fr.) P. Karst fungus

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Abstract: Two wood species originating South-East Asia were tested against natural resistance to destructive fungi. In aim to determine wood natural resistance to fungi mass loss and corresponding durability grades Highest grade was reached by *Shorea laevis* Ridl. Slightly lower *Gloeophyllum sepiarium* (Wulf. Fr.) P. Karst fungi resistance was shown by *Shorea acuminata* Dyer. wood.

Keywords: exotic wood species, natural resistance, *Gloeophyllum sepiarium* (Wulf. Fr.) P. Karst, *Shorea laevis* Ridl., *Shorea acuminata* Dyer.

INTRODUCTION

Exotic wood is nowadays widely used in many areas. Exotic species coming from tropical areas show very good physical and mechanical properties, and good resistance to biodegradation. For this reason, exotic wood is frequently used in external conditions.

In constructional wood and wooden elements expose to outdoor conditions, most likely, decay occurs. Process taking even several years may lead to serious and extensive construction damage. Fungi causing wood decay thru cellulose degradation significantly decrease most of the mechanical properties of wood. It is determined that amongst many fungi species growing on wood only 6% cause advanced decay (Krajewski and Witomski, 2005). One of the most common decaying fungi is *Gloeophyllum sepiarium*, attacking outdoor wood, especially in buildings and smaller elements. Commonly present in the engineering constructions, such as bridges, towers, telegraph poles, sleepers, garden architecture and storage yards. Described fungi is also present in the constructional elements: floor joists, rafter framings, external walls, post and pan walls, terraces and loggias.

Due to increasing number of exotic wood species on the market, especially ones with similar colors, it is necessary to determine which species could prove to be useful in particular applications. Good example of the research on this topic is determination of decaying fungi influence on wood durability.

Aim of the presented work is to determine natural resistance of *Shorea laevis* Ridl. and *Shorea acuminata* Dyer., against decaying fungus. Selected *Gloeophyllum sepiarium* (Wulf. Fr.) P. Karst fungi species is not included in the PN-EN 350-1:2000 standard.

MATERIAL AND METHODS

Methodic applied in the work was corresponding to instructions of PN-EN 350-1: 2000 and PN-EN 113 + A2: 1993 standards. Two originating from South-East Asia species were tested: *Shorea laevis* Ridl. and *Shorea acuminata* Dyer. Each species was cut into 50 x 25 x 15 mm samples (40 pieces, first dimension along the grain). In the same manner control samples of *Fagus sylvatica* L. were prepared, according to PN-EN 350-1:2000 standard. Exotic and control samples were exposed to *Gloeophyllum sepiarium* (Wulf. Fr.) P. Karst fungi during the 12 weeks period. For decaying power test of the fungi beech wood was used. The only exception from the standard was usage of the *G. sepiarium* fungi, which can be hazardous to the wood, in dependence of the environment conditions.

RESULTS

Work assesses *G. sepiarium* fungi influence on the wood, by determination of mass loss caused by the microorganisms during 12 weeks period. Independently on the species resistance loss was noticed.

Considering *G. sepiarium* fungi on mass loss, one may conclude that exotic wood showed more resistance than local wood (table 1) . Amongst tested species *Shorea laevis* Ridl. Showed best results, with mass loss of only 0,50%. Less resistance, resulting with 4,47%, was shown by *Shorea acuminata* Dyer wood. Highest mass loss of 7,56% was shown by local *Fagus sylvatica* L.

Table 1. Mass loss caused by *Gloeophyllum sepiarium* fungus influence

Wood species	Average mass		Average mass loss	Standard deviation
	initial	final		
	[g]		[%]	[g]
Shorea laevis Ridl.	15,44	15,36	0,50	0,32
Shorea acuminata Dyer.	9,00	8,57	4,47	0,30
Fagus sylvatica L.	11,83	10,82	7,56	3,7

Basing on the mass loss caused by *G. sepiarium*, exotic wood fungi resistance may be described as high, which is caused by fungistatic substances naturally present in the wood and high density.

Mass loss caused density change, which is presented in table 2 and on figure 1. after 12 weeks exposure to fungi density dropped in each case. Highest density drop of 8,6%, was shown by *Fagus sylvatica* L. For *Shorea acuminata* Dyer. wood density was lowered by 4,7%, nearly half of the control samples results. Lowest density drop was shown by *Shorea laevis* Ridl. (0,5%).

Table 2. Density loss caused by *Gloeophyllum sepiarium* fungus

Wood species	Average density	
	initial	final
	[kg/m^3]	
Shorea laevis Ridl.	852	848
Shorea acuminata Dyer.	472	450
Fagus sylvatica L.	662	605

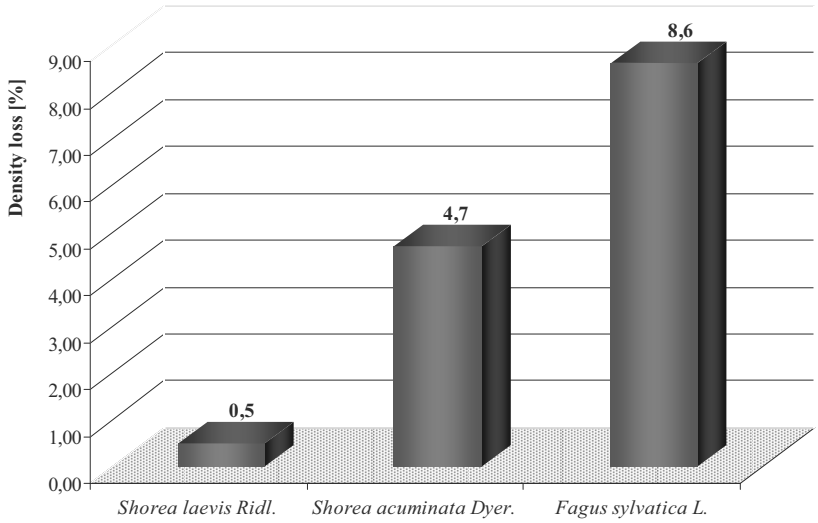

Figure 1. Density loss caused by *Gloeophyllum sepiarium* fungus

According to Cartwright and Findlay (1951) decay caused by fungi may lead to 30 % mass loss of undurable wood. In case of tested species total mass los may reach only around 5%. Therefore in classification proposed by Cartwright and Findlay (1951) all species tested in his work may be graded as durable. Extended resistance of tested species is caused by toxic substances present in the wood, having protective properties. Exotic wood in many cases has high density, rendering penetration by fungi difficult.

Basing on the presented data, one may conclude that tested exotic species hale high natural resistance, exceeding local species, against biological corrosion.

Obtained results allow classification of tested species into natural durability grades. Highest resistance is shown by *Shorea laevis* Ridl. It was graded into highest 1st class of resistance against *G. sepiarium* fungus. *Shorea acuminata* Dyer. was graded into 3rd resistance class. Obtained results are comparable to data presented by PN-EN 350-2:2000 standard. For *Shorea acuminata* Dyer. wood it is 3rt-4th durability class and for *Shorea laevis* Ridl. 2nd class of *Trametes versicolor* L. fungus resistance.

CONCLUSION

Basing on the presented data, one may conclude:

1. Highest durability grade amongst tested South-East Asian species against *G. sepiarium* fungus, was shown by *Shorea laevis* Ridl. wood. It was graded into 1st class of natural durability.
2. *Shorea acuminata* Dyer. wood was graded into 3rd natural durability class against *G. sepiarium* fungus.
3. In case of both tested exotic species *G. sepiarium* fungus caused lower mass loss than in case of local *Fagus silvatica L* wood.
4. *Shorea laevis* Ridl. wood is more appropriate to be used in outdoor conditions than *Shorea acuminata* Dyer. wood.

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5. PN-EN 350-2:2000 Trwałość drewna i materiałów drewnopochodnych – naturalna trwałość drewna litego. Wytyczne dotyczące naturalnej trwałości i podatności na nasycanie wybranych gatunków drewna mających znaczenie w Europie.

Streszczenie: *Badanie naturalnej odporności wybranych gatunków drewna pochodzących z Azji Południowo-Wschodniej na działanie grzyba Gloeophyllum sepiarium (Wulf. Fr.) P. Karst***.** Dwa gatunki drewna, pochodzące z Azji Południowo-Wschodniej, poddano badaniu naturalnej trwałości wobec grzyba, powodującego brunatny rozkład drewna. W celu określenia odporności na działanie tego mikroorganizmu określono zmiany gęstości, ubytek masy po 12. tygodniowym okresie ekspozycji na działanie grzyba, oraz ustalono klasę naturalnej trwałości. Wykazano, że najwyższą klasą naturalnej trwałości spośród badanych gatunków drewna, charakteryzuje się *Shorea laevis* Ridl. (1 klasa). Drewno *Shorea acuminata* Dyer. zostało zakwalifikowane do 3 klasy naturalnej trwałości wobec ataku ze strony grzyba *Gloeophyllum sepiarium (Wulf. Fr.) P. Karst***.**

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