11 BÖLÜM

AHŞAP VE AHŞAP YAPILAR

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GİRİŞ

Ağaçlar, bitkiler âleminin ayrılmaz üyeleri olup, genellikle estetik görünümleri ve boylarıyla dikkat çekerler. Kök, gövde, dallar ve yapraklardan oluşan ağaçların gövdeleri, yoğun karbon esaslı bir malzeme olan odundan meydana gelir. Yapraklarında bulunan klorofil sayesinde fotosentez yaparak karbondioksit ve suyu şekere dönüştürür, bu süreçte oksijen gibi hayati bir yan ürün üretirler (1). Büyüme sürecinde her yıl yeni odun katmanları eklenir ve odunun kütle yoğunluğu suyun yaklaşık yarısı kadardır. Ağaçlar, fotosentez yoluyla biyokütle biriktirerek karbon depolar; yaşam döngülerinin sonunda ise bu karbonu ayrışma veya yanma yoluyla atmosfere geri bırakırlar (2).

Tarih boyunca ağaçlar ve odunları insan yaşamı için hayati bir öneme sahip olmuştur. Odun, Paleolitik Çağ'dan bu yana temel bir yapı malzemesi olarak kullanılmış; alet, silah ve mobilya yapımında değerlendirilmiştir. Erken dönem insanları, odunu kalite, maliyet ve bulunabilirlik kriterlerine göre seçmiş; değerli

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KAYNAKLAR

1. V. Robert, The meaning of trees, 1st ed. Harper Collins Publishers, 2019.
2. G. Marriage, *Timber: trees and wood in construction*. LTD, 2024. doi: 10.1016/B978-0-323-98336-5.00007-8.
3. R. L. Youngs, "History, Nature, Products of Wood," *For. For. Plants Vol. II*, vol. II, pp. 131–157, 2009.
4. R. B. Hoadley, *Understanding wood: a craftsman's guide to wood technology*, 2nd ed. Newtown: CT: Tauton Press, 2000.
5. C. M. Popescu, *Wood as bio-based building material*. 2017. doi: 10.1016/B978-0-08-100982-6.00002-1.
6. H. Horiyama, Y. Miyoshi, K. Kojiro, and Y. Furuta, "Thermal softening properties of various wood species within an annual ring," *J. Wood Sci.*, vol. 69, no. 1, 2023, doi: 10.1186/s10086-023-02104-2.
7. H. McArthur and D. Spalding, "Timber and Timber Products," *Eng. Mater. Sci.*, pp. 406–464, 2004, doi: 10.1533/9781782420491.406.
8. C.-L. Huang, H. Lindstrom, R. Nakada, and J. Ralston, "Cell wall structure and wood properties determined by acoustics?a selective review," *Holz als Roh – und Werkst.*, vol. 61, no. 5, pp. 321–335, Oct. 2003, doi: 10.1007/s00107-003-0398-1.
9. D. Fengel and G. Wegener, *Wood Chemistry, Ultrastructure and Reactions*. Berlin: Walter de Guiter, 1989.
10. M. Plötze and P. Niemz, "Porosity and pore size distribution of different wood types as determined by mercury intrusion porosimetry," *Eur. J. Wood Wood Prod.*, vol. 69, no. 4, pp. 649–657, Nov. 2011, doi: 10.1007/s00107-010-0504-0.
11. W.-D. Ding, A. Koubaa, A. Chaala, T. Belem, and C. Krause, "Relationship between wood porosity, wood density and methyl methacrylate impregnation rate," *Wood Mater. Sci. Eng.*, vol. 3, no. 1–2, pp. 62–70, Mar. 2008, doi: 10.1080/17480270802607947.
12. C.-M. Popescu and C. A. S. Hill, "The water vapour adsorption–desorption behaviour of naturally aged Tilia cordata Mill. wood," *Polym. Degrad. Stab.*, vol. 98, no. 9, pp. 1804–1813, Sep. 2013, doi: 10.1016/j.polymdegradstab.2013.05.021.
13. Ł. Czajkowski, W. Olek, J. Weres, and R. Guzenda, "Thermal properties of wood-based panels: thermal conductivity identification with inverse modeling," *Eur. J. Wood Wood Prod.*, vol. 74, no. 4, pp. 577–584, 2016, doi: 10.1007/s00107-016-1021-6.
14. S. V. Glass and S. L. Zelinka, "Moisture relations and physical properties of wood. In: Wood Handbook-Wood as an Engineering Material. General technical report FPL-GTR-190," Madison, WI, 2010.
15. V. Bucur, *Acoustics of Wood*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2006. doi: 10.1007/3-540-30594-7.
16. H. Yang, L. Yu, and L. Wang, "Effect of moisture content on the ultrasonic acoustic properties of wood," *J. For. Res.*, vol. 26, no. 3, pp. 753–757, Sep. 2015, doi: 10.1007/s11676-015-0079-z.
17. S. Y. Zhang, "Effect of growth rate on wood specific gravity and selected mechanical properties in individual species from distinct wood categories," *Wood Sci. Technol.*, vol. 29, no. 6, Nov. 1995, doi: 10.1007/BF00194204.
18. J. E. Winandy and R. M. Rowell, "Chemistry of wood strength," in *Handbook of Wood Chemistry and Wood Composites*, R. M. Rowell, Ed. Boca Raton, FL: Taylor & Francis, 2005.
19. M. A. Ritter, "Properties of Wood and Structural Wood Products," in *Timber Bridges: Design, Construction, Inspection, and Maintenance*, United States Department of Agriculture Forest Service, 1990. (Online). Available: http://www.dot.state.mn.us/bridge/pdf/insp/USFS-TimberBridgeManual/em7700_8_chapter03.pdf
20. P. Bajpai, "Properties of Wood," *Biermann's Handb. Pulp Pap.*, pp. 215–232, 2018, doi: 10.1016/b978-0-12-814240-0.00007-0.
21. T. Shupe, S. Lebow, and D. Ring, "Wood Decay, Degradation & Stain," *Publ. 2703*, pp. 1–28,

2006, (Online). Available: http://www.lsuagcenter.com/NR/rdonlyres/C29C1E6F-2F5B-4F0D-A963-248E54EB4E83/51180/pub2703WoodDecayLowRes.pdf
22. R. A. Eaton and M. D. C. Hale, *Wood – Decay, Pests and Protection*. London, UK: Chapman & Hall, 1984.
23. C. D. M. Teles and Â. Do Valle, "Wood structures: Acting before deterioration," *Civil.Uminho. Pt*, pp. 857–866, 2001, (Online). Available: http://www.civil.uminho.pt/masonry/Publications/Historical constructions/page 857-866 _131_.pdf
24. M. Verbist, L. Nunes, D. Jones, and J. M. Branco, *Service life design of timber structures*. Elsevier, 2018. doi: 10.1016/B978-0-08-102110-1.00011-X.
25. F. T. Milton, *The Preservation of Wood e A Self Study Manual for Wood Treaters*. Minnesota, USA: University of Minnesota, College of Natural Resources, 1984.
26. A. F. Bravery, R. W. Berry, J. K. Carey, and D. E. Cooper, *Recognising Wood Rot and Insect Damage in Buildings*. Watford, UK: BRE – Building Research Establishment, 1993.
27. L. Nunes, "Termite infestation risk in Portuguese historic buildings," *Wood Sci. Conserv. Cult. Heritage. Braga, Port.*, no. December, pp. 117–122, 2008, (Online). Available: http://www.woodculther.com/wp-content/uploads/2009/03/nunes_11.pdf
28. H. Cruz, D. Jones, and L. Nunes, "Wood," in *Materials for Construction and Civil Engineering*, Cham: Springer International Publishing, 2015, pp. 557–583. doi: 10.1007/978-3-319-08236-3_12.
29. E. Mergny, R. Mateo, M. Esteban, T. Descamps, and P. Latteur, "Influence of cracks on the stiffness of timber structural elements," *WCTE 2016 – World Conf. Timber Eng.*, no. August, 2016.
30. G. Papp *et al.*, "Changes in DRIFT spectra of wood irradiated by UV laser as a function of energy," *J. Photochem. Photobiol. A Chem.*, vol. 173, no. 2, pp. 137–142, Jul. 2005, doi: 10.1016/j.jphotochem.2005.01.012.
31. K. Kránitz, W. Sonderegger, C.-T. Bues, and P. Niemz, "Effects of aging on wood: a literature review," *Wood Sci. Technol.*, vol. 50, no. 1, pp. 7–22, Jan. 2016, doi: 10.1007/s00226-015-0766-0.
32. T. Nilsson and G. Daniel, "Structure and the Aging Process of Dry Archaeological Wood," in *Advances in Chemistry Series No 225*, R. M. Rowell and R. J. Barbour, Eds. American Chemical Society, 1990. doi: 10.13140/2.1.2369.0881.
33. N. M. Stark, Z. Cai, and C. Carll, "Wood-based composite materials: panel products, glued-laminated timber, structural composite lumber, and wood–nonwood composite ma – terials," in *Wood Handbook: Wood as an Engineering Material*, Madison, WI: Department of Agriculture, Forest Service, Forest Products Laboratory, 2010.
34. H. Thoemen, M. Irle, and M. Sernek, *Wood-Based Panels—An Introduction for Specialists*. London, UK: Brunel University Press, 2010.
35. M. Hughes, "Plywood and other veneer-based products," in *Wood Composites*, Elsevier, 2015, pp. 69–89. doi: 10.1016/B978-1-78242-454-3.00004-4.
36. Z. Cai and R. J. Ross, "Mechanical properties of wood-based composite materials," in *Wood Composites*, Madison, WI: Department of Agriculture, Forest Service, Forest Products Laboratory, 2010.
37. R. M. de Barros Filho, L. M. Mendes, K. M. Novack, L. O. Aprelini, and V. R. Botaro, "Hybrid chipboard panels based on sugarcane bagasse, urea formaldehyde and melamine formaldehyde resin," *Ind. Crops Prod.*, vol. 33, no. 2, pp. 369–373, 2011, doi: 10.1016/j.indcrop.2010.11.007.
38. X. Xu, F. Yao, Q. Wu, and D. Zhou, "The influence of wax-sizing on dimension stability and mechanical properties of bagasse particleboard," *Ind. Crops Prod.*, vol. 29, no. 1, pp. 80–85, Jan. 2009, doi: 10.1016/j.indcrop.2008.04.008.
39. T. Nishimura, *Chipboard, oriented strand board (OSB) and structural composite lumber*. Elsevier Ltd., 2015. doi: 10.1016/B978-1-78242-454-3.00006-8.
40. F. F. P. Kollmann, E. W. Kuenzi, and A. J. Stamm, *Principles of Wood Science and Technology*. Berlin, Heidelberg: Springer Berlin Heidelberg, 1975. doi: 10.1007/978-3-642-87931-9.

41. J. Švajlenka and M. Kozlovská, *Efficient and Sustainable Wood-based Constructions*. 2022. doi: 10.1007/978-3-030-87575-6.
42. J. P. Wacker, "Use of wood in buildings and bridges," in *Wood Handbook—Wood as an Engineering Material*, R. J. Ross, Ed. Madison, WI: FPL-GTR-190, 2010.
43. J. N. Walker, *Post-Frame Building Design*, 1st ed. American Society of Agricultural and Biosystems Engineering, 1992.
44. Forest Products Laboratory, "Wood handbook : wood as an engineering material.," 1999. doi: 10.2737/FPL-GTR-113.
45. K. Vahtikari, J. Silvo, H. Metsala, and O. Paajanen, "The development of wood floor construction in Finland," *For. Prod. J.*, vol. 62, no. 5, pp. 388–394, 2012, doi: 10.13073/0015-7473-62.5.388.
46. E. Serrano and B. Källander, "Building and construction – timber," *Adhes. Bond. Sci. Technol. Appl.*, pp. 328–356, 2005, doi: 10.1533/9781845690755.3.328.
47. A. C. Woodard and H. R. Milner, *Sustainability of timber and wood in construction*, Second Edi. Elsevier Ltd., 2016. doi: 10.1016/b978-0-08-100370-1.00007-x.