ECOPHYSIOLOGY OF CONIFEROUS FORESTS pdf

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Ecophysiology of Coniferous Forests (Physiological Ecology) and millions of other books are available for Amazon Kindle. Learn more Enter your mobile number or email address below and we'll send you a link to download the free Kindle App.

Coniferous Forests Coniferous forests are dominated by gymnosperm trees such as pines, spruces, and firs. Conifers were the first plants to evolve seeds. Gymnosperms from the Greek words gymnos, meaning "naked," and sperma, meaning "seed" have seeds exposed to the environment on cones. In most species, male and female cones occur on the same tree, but the Juniperus juniper and Taxus yews genera have species with separate male and female trees. Male cones are smaller than female cones and produce pollen in the springtime. The larger female cones are able to be fertilized only when they are young and often unnoticeable. Most conifers rely on wind to carry their beautiful and diversely shaped pollen grains to the female cone. The phylum Coniferophyta is organized into two orders. Older classification schemes included a third, Ginkgoales, containing only one species Ginkgo biloba ; more recent classification schemes now place Ginkgo into its own phylum, Ginkgophyta. Coniferales, with five families and over six hundred species, including the species most often identified with coniferous forests, is the most populous order. Bristlecone pine Pinus aristata can live to be over six thousand years old; coastal redwoods Sequoia sempervirens grow to be over one hundred meters tall; and Monterey pine Pinus radiata is one of the most productive timber species. The Taxales order contains two families and over thirty species but is best known for the poisonous yew Taxus genus. Conifer Leaves Most conifers are evergreen, meaning that they maintain green leaves, usually needles, year-round. Needles exist in all families. Scalelike leaves often obscuring the woody portion of the shoot exist in the Cupressaceae, Podocarpaceae, and Taxodiaceae families. The Podocarpaceae family contains the only broadleaf conifers. Two genera, the celery pine Phyllocladus, found in the Southern Hemisphere and the Japanese umbrella pine Sciadopitys , do not contain true leaves and instead carry out photosynthesis using specially adapted shoots. In climates with mild, wet winters and warm, dry summers, drought adaptations and the ability to conduct photosynthesis all winter give evergreen conifers a distinct advantage over deciduous angiosperms. In the boreal forest , conifers succeed due to a combination of factors. First, growing seasons are short and conifers are able to begin photosynthesis with a full canopy as soon as temperatures warm. Second, because needles last from two to ten years, conifers need to replace fewer leaves each year than deciduous trees. Since leaves require large amounts of nutrients, nutrient-poor areas such as the boreal forest and the southeastern United States are often dominated by conifers. Third, conifers are more able to resist periodic drought stresses common in the boreal forest. Nearly all conifers are evergreen but there are four deciduous genera: Larix, Pseudolarix, Metasequoia, and Taxodium. The Larix and Pseudolarix common name larch live in the boreal forest. In addition to possessing good cold-resistance, larches have high photosynthetic rates, flush early in the spring, and use nutrients very efficiently. Metasequoia, the dawn redwood, grows well on damp sites. Taxodium, the swamp cypress, grows in standing water in the southeast United States and parts of Mexico. Distribution of Coniferous Forests Coniferous forests exist in many climates around the world. The Podocarpaceae family is distributed in tropical and subtropical climates in South America and Southeast Asia. Small areas of southern Chile and western Argentina have coniferous Araucaria species living with evergreen broadleaf species. Mexico and Central America have pine forests in high elevation mountain ranges. Western North America and Japan support one million square kilometers of coastal coniferous rain forests. With nearly sixteen million square kilometers, the northern latitude boreal forests contain the vast majority of coniferous forest area. The Eurasian boreal forest begins in Scandinavia and extends east in a widening band all the way to the Kamchatka Peninsula in eastern Russia. Forested areas called subalpine forests cover about three million square kilometers in the U. Rocky Mountains , mid-elevation areas in the Himalayas , and other temperate mountain ranges. In Alaska and northwestern Canada, the boreal forest is primarily composed of black spruce Picea mariana , white spruce Picea glauca , and larch Larix laricinia. Farther south and in isolated warm northern areas, aspen and birch intermingle. In central Canada, lodgepole pine Pinus contorta , jack pine

Pinus banksiana , and balsam fir Abies balsamea appear. East of the Great Lakes , red pine Pinus resinosa , eastern white pine Pinus resinosa , oaks, and maples are common. The Rocky Mountains resemble the boreal forest but are distinguished by the presence of subalpine fir Abies lasiocarpa. Engelmann spruce Picea engelmannii replaces black and white spruce. In the central Rockies, drier regions of the northern Rockies, and high elevations of the southern Rockies, Douglas-fir Pseudotsuga menziesii and ponderosa pine Pinus ponderosa are common. In the southern Rockies, Engelmann spruce remains at higher elevations. Trembling aspen exists throughout the Rocky Mountains. The temperate rain forest , stretching along coastal North America from northern California to southern Alaska, contains western red cedar Thuja plicata , Douglas-fir, Pacific silver fir Abies amabilis , Sitka spruce Picea sithcensis , and hemlock Tsuga heterophylla. Redwoods Sequoia sempervirens indicate the southern limit of the temperate rain forest. The giant sequoia Sequoia gigantea , one of the largest trees in world, grows well on the western Sierras in California. Plant-Animal Interactions Most conifers do not rely on insects, birds, or mammals to distribute their seeds and therefore have fewer readily observable examples of plant-animal interactions than flowering plants. Nonetheless, insects, birds, and mammals maintain strikingly diverse interactions with the coniferous trees in their habitat. With few exceptions, insects in conifer forests are pests. Moths and butterflies are highly destructive, as are spruce budworms. All coniferous forests have some level of insect infestation. Vigorous forests use sap and other compounds to defend themselves against insects and are rarely catastrophically damaged. Forests in decline as a result of fire suppression or improper management are much more susceptible to insect outbreaks. Birds in coniferous forests eat seeds and sometimes inadvertently help to plant trees. The birds collect more seeds than they eat and the leftovers germinate. Insect-eating birds such as chickadees, nuthatches, and woodpeckers help to control insect populations. Owls and hawks live in coniferous forests and many, such as the spotted owl, use dead coniferous trees for nesting sites. Mice and squirrels are the most common mammals in the coniferous forest. During the summer, these animals eat buds, berries, seeds, and even bark. Squirrels plan ahead for winter by collecting cones. As with birds not all the seeds are eaten, and some germinate into new trees. Deer, elk, mountain lions, bears, and other large mammals found in coniferous forests do not consume significant amounts of seeds or foliage. By chewing completely around a tree, porcupines interrupt the flow of sugars from leaves to roots. They are the only mammal besides humans known to kill coniferous trees. Natural and Human-Managed Coniferous Forests Coniferous forests exist along a gradient from purely natural to purely human created. The boreal forest, because it is so inhospitable and often contains commercially undesirable trees, contains the largest natural coniferous forests. Wildfires, insect outbreaks, and other disturbances are usually uncontrollable in remote boreal forests. In these forests, there is a variety of tree and undergrowth species; abundant animal, insect, and microbial life; and a natural fire cycle. For most of the twentieth century the U. Forest Service pursued a policy of total fire suppression. Without fire, open stands of ponderosa pine were invaded by dense thickets of Douglas-fir and lodgepole pine. Insect outbreaks became common and fuels began to accumulate on the forest floor. Unmanageable and devastating fires such as the Yellowstone National Park fire caused a shift in public and scientific opinion; forest managers began to reincorporate fire through controlled burns and forests are now beginning the long process of regaining their natural relationship with fire. In plantation forests, timber companies are interested in producing the maximum possible amount of commercial timber, not maintaining a diverse forest community. Many areas are planted with a single species at the same time. Conifers such as Monterey pine and slash pine Pinus caribaea , because they grow straight and quickly, are popular plantation trees. The lack of species diversity and geometrical forest arrangement make plantations very different from natural or partially managed forests. Plantations do not support diverse ecosystems nor are they are desirable for recreation. Society, however, has a large demand for forest products and maximizing plantation production reduces the need to exploit other forests. White Bibliography Archibold, O. Ecology of World Vegetation. Chapman and Hall, Fire and Vegetation Dynamics: Studies from the North American Bo-real Forest. Cambridge University Press, The Pines of Mexico and Central America. The World of Northern Evergreens. Comstock Publishing Associates, Facts on File, Ecophysiology of Coniferous Forests. Resource Physiology of Conifers: Acquisition, Allocation, and Utilization. Cite this article Pick a style below, and copy the text for your bibliography.

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The process of defining the ecological risk that air pollutants like O 3 pose for coniferous forests requires approaches that exploit existing databases, environmental monitoring of air pollutants and forest resources, experiments with well-defined air pollution treatments and environmental control/monitoring, modeling, predicting air pollution-caused changes in productivity and ecological processes over time and space, and integration of social values.

Forest trees and shrubs play vital ecological roles, reducing the carbon load from the atmosphere by using carbon dioxide in photosynthesis and by the storage of carbon in biomass and wood as a source of energy. Autoecology deals with all aspects of woody plants; the dynamism of populations, physiological traits of trees, light requirements, life history patterns, and physiological and morphological characters. Ecophysiology is defined by various plant growth parameters such as leaf traits, xylem water potential, plant height, basal diameter, and crown architecture which are, in turn, influenced by physiological traits and environmental conditions in the forest ecosystem. In short, this book details research advances in various aspects of woody plants to help forest scientists and foresters manage and protect forest trees and plan their future research. Autoecology and Ecophysiology of Woody Shrubs and Trees is intended to be a guide for students of woody plant autoecology and ecophysiology, as well as for researchers in this field. It is also an invaluable resource for foresters to assist in effective management of forest resources. Taking readers out of the laboratory and into the humid tropical forests, this comprehensive volume explores the most recent advances occurring in tropical plant ecophysiology. Drawing on the knowledge of leading practitioners in the field, this book synthesizes a broad range of information on the ways in which tropical plants adapt to their environment and demonstrate unique physiological processes. This book is arranged into four sections which cover resource acquisition, species interactions, ecophysiological patterns within and among tropical forest communities, and the ecophysiology of forest regeneration. These sections describe plant function in relation to ecology across a wide spectrum of tropical forest species and growth forms. How do different species harvest and utilize resources from heterogeneous tropical environments? How do patterns of functional diversity reflect the overwhelming taxonomic and morphological diversity of tropical forest plants? Such fundamental questions are examined in rich detail. To illuminate the discussions further, every chapter in this book features an agenda for future research, extensive cross referencing, timely references, and the integration of ecophysiology and the demography of tropical species where the data exist. Tropical Forest Plant Ecophysiology provides plant scientists, botanists, researchers, and graduate students with important insights into the behavior of tropical plants. Biologists and foresters interested in tropical ecology and plant physiological ecologists will also benefit from this authoritative and timely resource. This is the first truly modern book solely devoted to seed reproduction of forest trees-from flowering to establishment, with emphasis on the interaction of environment with physiological processes. Focus is on seed function in natural settings and the application of information to natural regeneration of forests. This easy-to-read text addresses important principles and provides in-depth coverage of existing literature. Presentation of the information is organized to allow for a natural development of the main theme with full explanations of such important components as seed production, dispersal and germination, as well as the integral parts played by water, temperature, light, chemicals, animals, pathogens and aging. A highly useful book for investigators, practitioners or students.

3: Faculty & Staffâ€”Forestry & Wildland Resources

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ECOPHYSIOLOGY OF CONIFEROUS FORESTS pdf

Conifers--pine, fir, and spruce trees--are dominant species in forests around the world. This book focuses on the physiology of conifers and how these physiological systems operate. Special consideration is devoted to the means by which ecophysiological processes influence organismal function and distribution.

5: Ecophysiology of Coniferous Forests : Jacques Roy :

Conifers--pine, fir, and spruce trees--are dominant species in forests all over the world. This e-book makes a speciality of the body structure of conifers and the way those physiological structures function. specific attention is dedicated to the capability through which ecophysiological methods impact organismal functionality and distribution.

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