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Great Places Green Spaces

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Key topics: How to prepare for Spring!

By Jacob Dyer

Now that it is Mid-Winter, a lot of South Dakotans are looking forward to Spring days and are thinking about planting new trees in the landscapes. Living in a state with extremes in weather and soil, it can be difficult to select an appropriate tree. In this article, I will cover the concept of site, hardiness including the use of plant hardiness zone, and plant heat-zone map.

What Does Site Mean?

Site is a very generic term used by professionals to indicate the combination of environmental conditions that may impact tree growth and survival. In urban settings this will likely include amount of light and water, soil conditions, and growing space at a particular location.

Light impacts growth very directly through photosynthesis, or the ability of a tree to generate sugars and other chemicals for growth. Because trees generate their own energy for growth and this energy is generated by the presence of light, they are very dependent of specific amounts of light for optimal growth. Not all trees need a lot of light. In fact, some species do poorly in high light conditions. If you can imagine a building for which we can plant a tree on any side. Trees on the north side of a building will receive the least amount of light – a site suitable for low-light demanding species. South and west sides receive a lot of light, perhaps suitable for high-light species. Additionally, you could imagine planting underneath a pre-existing canopy of taller trees versus in the open. Typically, light will be a very local phenomena, meaning it will be dictated by very local environs such as buildings, homes, other trees, hills, etc.

Requirements for water are a very easy thing for us South Dakotans to grasp – good moisture East River and relatively poor moisture West River (except parts of the Black Hills). In general, there is a moisture gradient going east to west, from around 32 inches per year to 16 inches per year. Certain species of trees are very well adapted to high moisture, whereas others cannot handle high moisture. This is important to keep in mind with the hardiness zone maps.

Soils are very complicated in South Dakota. Ranging from glacially derived tills and moraines in the East River area, to strictly erosional shales in Central to West River areas, to limestone and igneous derived soils in the Black Hills. This reflects the complex history of geology in the state. East River was buried under a glacier around 10-15 thousand years ago, whereas, West River has been exposed to natural erosion processes since the inland seaway during the Cretaceous.

Know Your Zone!

around 65 million years ago). This has generated a general soil fertility gradient from East River (typically has more fertile) to West River (typically less fertile), though certain local processes such as intensive agriculture and use of irrigation have altered this trend.

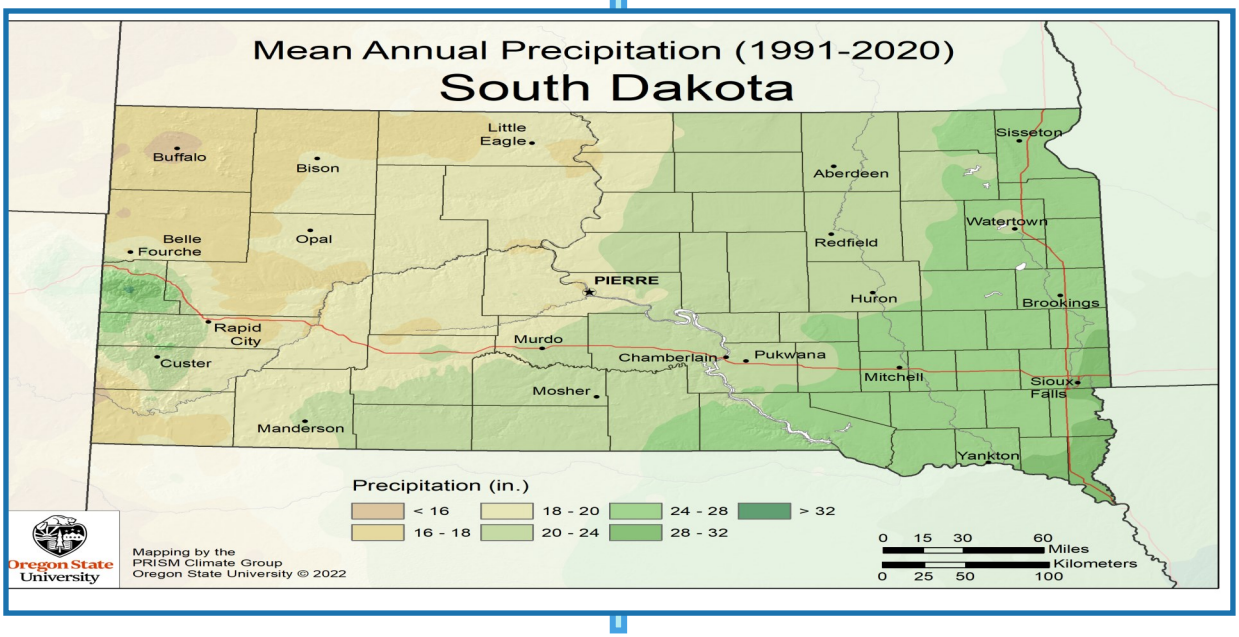
Lastly, growing space is a consideration often missed. Trees that can grow large in height or width may not be suitable for planting in areas adjacent to homes, businesses, or any other important infrastructure such as power lines, utilities, certain rights of ways, or certain sides of structures depending on how much shade/sun one desires. It is important to consider what the maximum size of a species of tree is going to be in your region of the state when planning where to plant trees.

What Is Hardiness?

Hardiness is a tree's ability to survive harsh winter conditions, specifically low temperature extremes. However, some arborists are increasingly considering the ability of a tree to survive harsh summer temperature extremes as a component of hardiness. The last facet of hardiness is the ability of a tree to resist insects and disease.

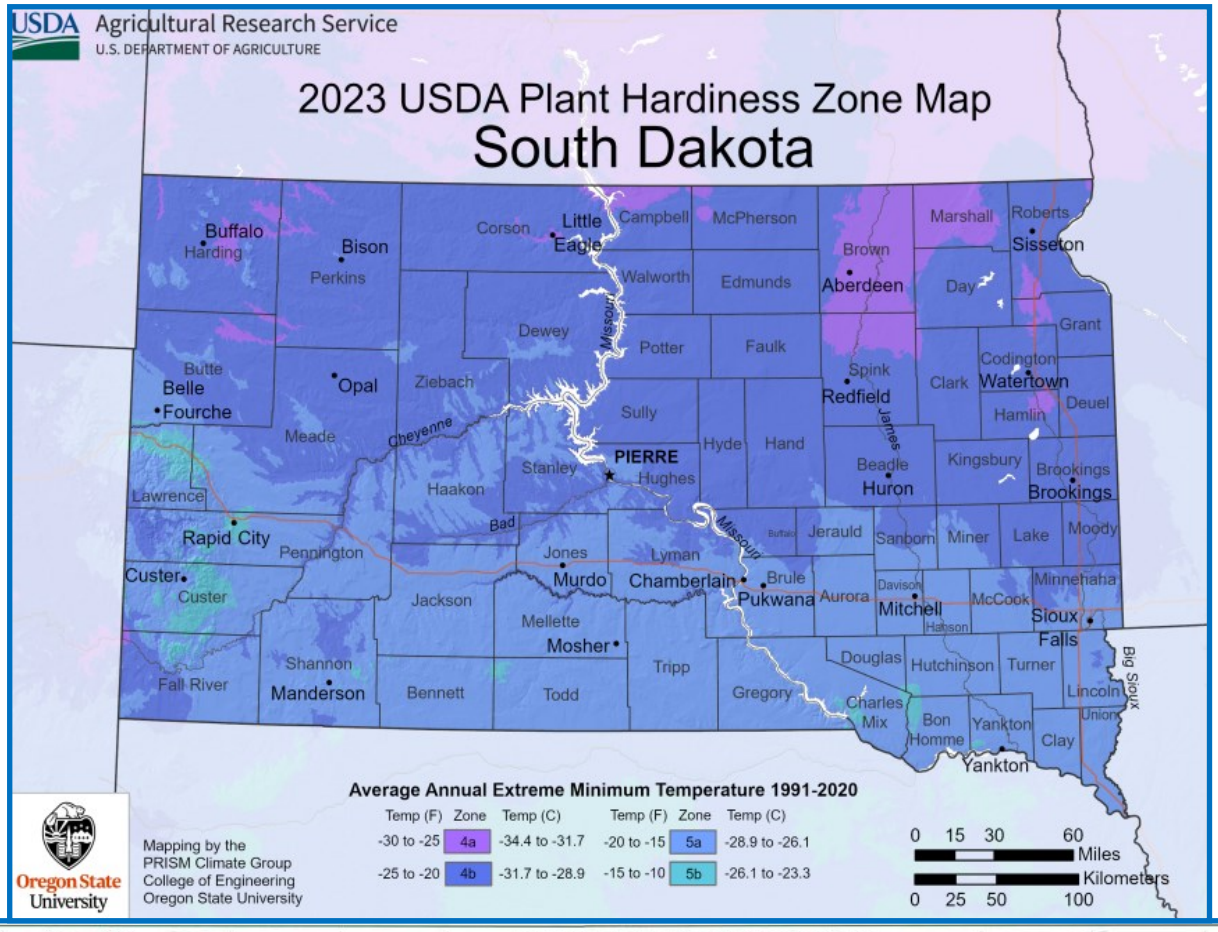
A plant heat-zone map has been developed by the American Horticultural Society. This map uses the number of days during a year with a high temperature greater than 86° Fahrenheit. Here in South Dakota, there is a camel hump distribution of heat – central and southern parts of the state receive the greatest number of days over 86°, between 60 and 90 days per year, while regions in the Northeast, Northwest, and Black Hills receive the fewest, as low as 14 to 30 days per year.

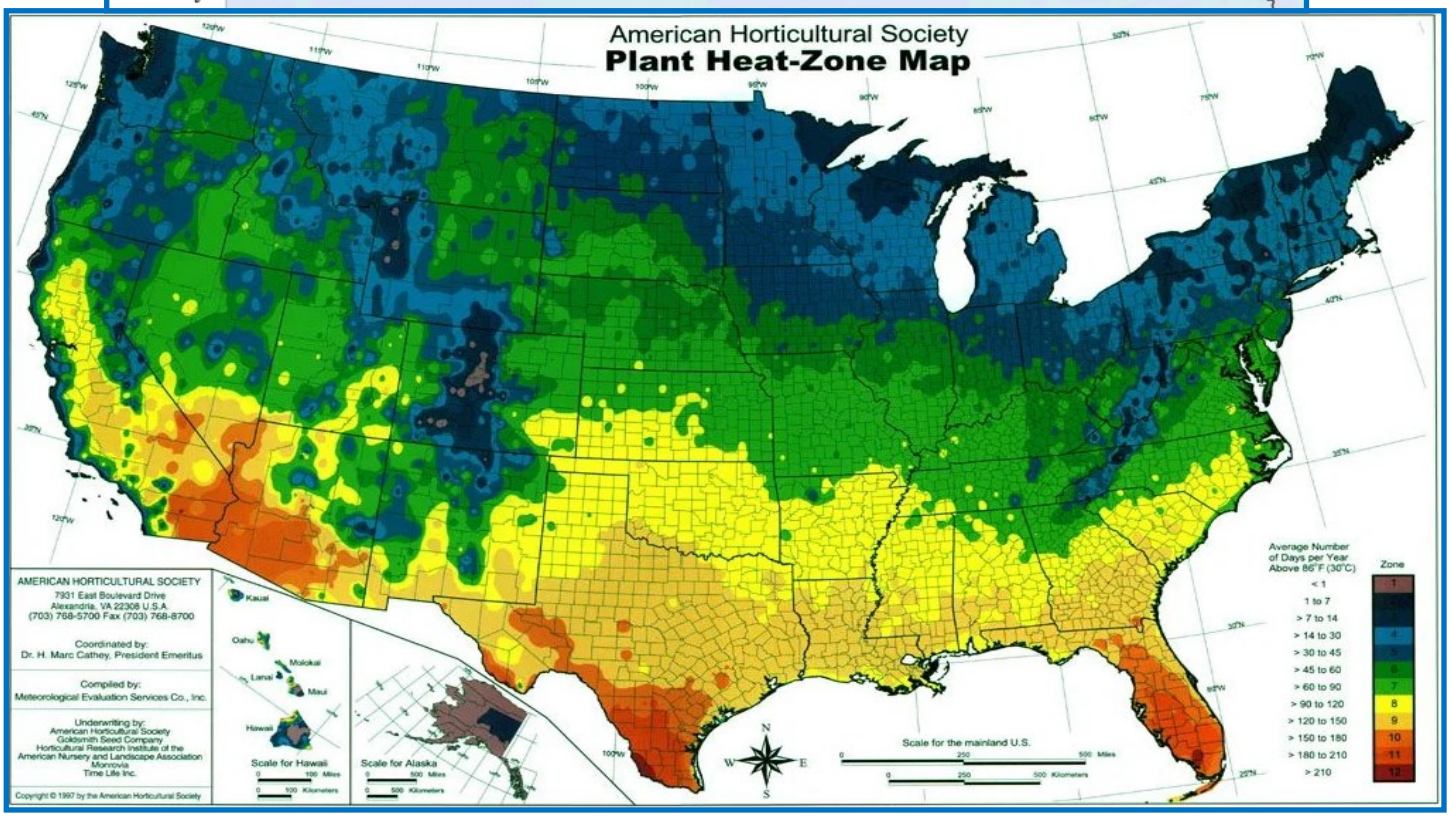
Plant hardiness zone maps are one indicator of a tree's ability to survive winter in each region. These maps depict the average maximum low temperature achieved each year, typically averaged over 30 years. That is to say, the absolute lowest temperature during the year sets the bar for each year and those values are averaged. The latest map was produced in 2023 and reflects temperatures from 1991-2020. Here in South Dakota, we range from Zone 5b (-15° to -10° Fahrenheit) to Zone 4a (-30° to -25° Fahrenheit). The trend is more extreme winter temperatures north and northeast to less extreme winter temperatures south to southwest.



"If a tree dies, plant another in its place." - Carl Linnaeus

Zoning Visualized





Further Considerations

Taken together, winter and summer extremes can provide better guidance on selecting hardy tree species than either one alone. Caution needs to be utilized when selecting tree species on hardiness zone maps alone, and vice versa with heat-zone maps alone.

Lastly, it is important to discuss the resistance of a tree species to insects and diseases. For example, emerald ash borer is an ongoing and emergent threat to ash trees here in South Dakota. It is strongly advised to not plant any ash and begin removing and replacing ash trees with species that have fewer insect and disease issues. Also, American elm has suffered greatly due to Dutch Elm Disease, and it is a species that is not promoted for urban tree plantings. Lastly, depending on the region of the state some species may have a great load of insect and disease possibilities versus others. It is advised to contact your local service forester for direction on selecting resistant varieties.

4) Getting it done!

Please pay attention to the hardiness and heat-zone maps. When it comes to other traits, that is a personal choice. Please get in touch with the regional service foresters, whose contact info is provided on the right of this page.

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