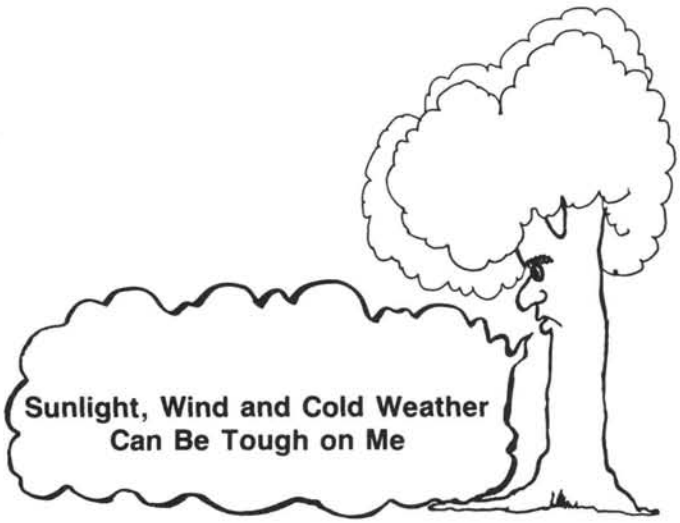

Man's reaction to cold is immediate — we bundle up, move indoors, or suffer the consequences with alarming rapidity.

Trees may look contently inactive all winter long, but they also can suffer at the hands of winter. The damage may not show until spring, but nonetheless, winter is a test of strength for trees just as it is for other living creatures.

Low temperature isn't the sole culprit. Cold, bright sun, wind and soil frost combine to take their toll in the forest. Come spring, the appearance of brown, dead branches, and whole trees as well, will attest to the severity of another Wisconsin winter.

"The problem is called 'winter burn'," says Gordon Cunningham, retired University of Wisconsin - Extension forester. "During the deep freeze of mid-winter, moisture is removed or transpired from tree bark and foliage faster than the roots can replace it."

Many factors contribute to this dehydration. All plants lose water through their leaves or needles. Transpiration is a physiological cooling mechanism similar to perspiration. The winter burn problem begins when, despite the cold air, sunlight warms the foliage and branches enough to increase transpiration.

More warming can occur when snow reflects even more sunlight onto the plant. This reflected sunlight and wind can further increase the amount of water lost by carrying moisture away more rapidly.

Winter burn is caused by more than the rapid loss of moisture through transpiration. At the same time the tree is losing essential moisture to the air, it's also unable to replace lost water because its roots are threaded through frozen ground. Ice isn't a good source of water for plants because it isn't readily absorbed. In cold weather the liquid water that is available moves more slowly into the tree and through its cells.

"Sunlight, wind and radiation off the snow combine to cause excess transpiration, and set the stage for winter burn," Cunningham says. The extent of the burn also depends on how deeply the ground is frozen and how deep the tree's root system extends.

Statistical Reporting Service, late December of this winter showed an average frost depth of 5½ inches compared to 3½ inches last December. Both of these years are below the long-term aggravates the winter burn problem.

Winter burn isn't very visible in the winter. "The burn is initiated in the extreme cold of winter," cays Cunningham, "but it won't be noticeable until late winter or early spring, when damaged foliage starts turning brown, twigs don't bud out, or dead bark becomes noticeable. Just think how long Christmas tree needles look green."

When spring arrives, the dying foliage and branches will be most visible on the tree's south and west faces — the sides where winter sunlight is most intense. Severe winter burn can kill an entire tree, but more often it will damage only portions.

"Sometimes you can judge how deep the snow cover was in a spot by examining low evergreens for the extent of winter burn," says Cunningham. "Snow is a good insulator, so the parts of the evergreen that were buried will be alive and green. But there can be a sharp line above which needles are brown — these were above the snow and subjected to wind, sun and harsh weather."

Winter burn is harder to spot in bare, deciduous trees than in conifers. Thin-barked trees like maple will show "frost cracks." These are small cracks in the bark that form when a cold spell freezes sun-warmed water in the underbark. The extent of the damage to a deciduous tree won't be known until spring, when it will be clear which branches blossom and which don't.

For forest trees, winter burn is just one of nature's tests. It is a factor in the process of natural selection by which the more resistent survive to reproduce.

You can help lawn shrubbery and small trees by protecting them, Cunningham says. Install burlap shields around the south and west sides of susceptible plants. These shields will block wind and sun.

"You'll find more damage to shady-site trees like yews. These will winter burn more severely than sun-tolerant species like junipers," Cunningham says. This is because yew foliage has a thinner cuticle, or outer skin, which loses moisture more easily than waxy juniper needles.

In fact, one of the best ways to avoid losing trees to winter burn is to keep site-preference in mind when planting. In our severe winter climate, yews do better when they are protecting from the sun, perhaps in the shade of buildings, while junipers will tolerate the sunny southwest exposures.

This information was made available by the College of Agricultural and Life Sciences, UW-Madison.