

ing effect. The amount of influence thus exerted depends, of course, upon the character and the closeness of the tree-crowns,—a thick stand of forest having a greater quantitative effect, in the direction indicated, than a thin stand; while an evergreen forest has less effect in summer, and greater effect in winter, than a deciduous forest.

Control of Winds and Storms by the Forest.

One of the most important influences of the forest is due to its action as a wind-break. On its windward side, the effect of the forest is slight. But on the leeward side, the checking of the velocity of winds results in partial or complete stagnation of the air, with the phenomena attendant upon stagnation, namely, increased humidity of the air, decreased evaporation from the ground and from plants, higher temperature during the day, and lower temperature at night. Hence the effect of the windbreak is occasionally injurious, in favoring night frosts. But this is only occasional. The ratio between the *width of the area protected* and the height of the windbreak, has been variously stated by different observers, but a moderate estimate is, that for every foot of height of the windbreak, an area of ten feet in width is protected. Thus a belt of trees 30 feet high will protect from cold, drying winds, objects on its leeward side at a distance of 300 feet back from the belt.

Protection from lightning is, in all probability, afforded to buildings by single trees, to a greater extent by clumps and belts of trees, and it is equally probable that extensive forests, while they may increase the frequency, reduce the intensity and destructiveness of thunderstorms over their own areas and beyond.

Influence of the Forest on Evaporation and Humidity.

In the forest, evaporation from three sources is to be considered: (1) Evaporation from the soil; (2) transpiration from the leaves; (3) evaporation from rainfall intercepted by the leaves, branches and trunks of trees. German experimenters have established for these quantities the following values: As compared with the amount evaporated from a free water surface in the open (1) the evaporation from soil under forest litter and within the forest, is 13 per cent; (2) transpiration from the leaves, 77 per cent; (3) evaporation of intercepted rainfall, 61 per cent; total, 151 per cent. On the same basis of comparison, the amount of moisture added to the air over cereals on the average is 173 per cent; over sod, 192 per cent; over bare soil, 60 per cent.

The forest, therefore, is more conservative of moisture than sod or cereal crops, but returns to the air $2\frac{1}{2}$ times as much moisture as does the bare soil.