

The further spray droplets have to travel to reach the target, the more chance there is that drift can occur. Again nozzle manufacturers' catalogues provide good charts or tables on nozzle-to-target heights for various nozzle configurations.

New technology

New technology is coming in turf sprayers. A number of systems are now available that can maintain the rate of application even with variations in spraying speed. These rate controllers use existing micro processor technology. The sprayer operator programs the rate controller by merely entering his operating parameters into the machine. True ground speed is measured from a non-driven wheel or by means of radar. Flow of liquid to the boom is also measured by means of a flow meter. All this information is then used by the rate controller to deliver your programmed application rate. As spraying speed changes, the rate controller adjusts the liquid flow to the boom to maintain your set rate. This adjustment is accomplished by varying the pressure. Keep in mind what we said earlier about pres-

sure and droplet size.

As you travel faster the pressure will increase to maintain your set rate. To stay within nozzle operating pressure ranges you should not vary from your calibrated spraying speed by more than $\pm 10\%$. Put in other words if you programmed the controller with a spraying speed of 3.0 mph you should keep your travel speed between 2.7 and 3.3 mph.

In doing so, the operating pressure on the nozzles should remain within acceptable limits. You can see from this discussion that even with rate controllers the operator has some operating limitations.

[An address presented at the 1993 Ontario Turfgrass Symposium]

GRASS CLIPPINGS

Rhizotomous turfgrasses spread by below-ground, lateral shoots, called rhizomes. New plants can emerge on the rhizome at some distance from the parent plant, closing in bare spaces and forming a dense turf. With good management recovery from winter injury may be achieved without overseeding.

Stoloniferous turfgrasses spread by above-ground, lateral shoots, called stolons. Shoots tend to grow horizontally resulting in a grainy turf. This feature is found among some warm season species and some cultivars of creeping bentgrass.

There are 13 elements required for turf growth which are taken up by the root system. They are nitrogen (N), phosphorus

(P), potassium (K), calcium (Ca), magnesium (Mg), sulphur (S), iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), molybdenum (Mo), boron (B), and chlorine (Cl). The first six are called macro nutrients whereas the remaining seven are termed micro nutrients because they are required in very small or trace amounts.

Water is used by turf for growth, transpiration from the stomata and evaporation from the leaves and soil surface. The latter two are grouped together in a term called evapotranspiration. The rate of water use may vary from near zero on a cool, calm and foggy day to 7.5 mm on a hot, sunny and windy day where the relative humidity is less than 30%.



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