CONCLUSIONS

The following conclusions can be made regarding the wear tolerance studies conducted in this investigation:

1. The wear simulator worked effectively on small plots and adequately separated species wear tolerance differentials.

2. Turfgrass species were found to vary significantly in wear tolerance in the following order: Manhattan perennial rye-grass > Kentucky 31 tall fescue and Merion Kentucky bluegrass > Italian ryegrass > Pennlawn red fescue > Cascade chewings fescue > rough bluegrass.

3. Percent verdure, total cell wall content (TCW), and chlorophyll content per unit area remaining after wear treatment can be used to quantitate wear tolerance differentials among species.

4. Percent verdure remaining after wear treatment was determined to be the preferred method of measuring wear injury. It involved fewer procedural steps and calculations, making it a
a more rapid determination than either TCW or chlorophyll content.

5. Turfgrass species varied significantly in TCW, lignocellulose, cellulose, hemicellulose, and lignin contents expressed on a dry weight and on a mg dm$^{-2}$ basis.

6. Cell wall components expressed as a percent on a dry weight basis do not correlate with species wear tolerance.

7. TCW, lignocellulose, cellulose, hemicellulose, and lignin contents expressed on a mg per dm$^2$ basis were significantly correlated to wear tolerance.

8. The combined effects of TCW, lignocellulose, cellulose, and lignin on the dry weight basis accounted for a significant portion (96%) of the variation in wear tolerance among the seven turfgrass species.

9. The combined effects of TCW, lignocellulose, cellulose, hemicellulose, and lignin expressed as mg dm$^{-2}$ accounted for 97% of the observed variation in wear tolerance among the species tested.
10. The TCW on a mg dm$^{-2}$ basis accounted for 78% of the variation observed.

11. Cell wall constituents increased with plant maturity for the turfgrass species tested. Plant age can influence wear tolerance differentials.

12. Percent total cell wall content varied significantly during the growing season. Date of treatment could influence wear tolerance studies.

13. Leaf blade cell wall constituents were significantly less than leaf sheath cell wall constituents for all species examined.

14. The original verdure, shoot density, leaf width, load bearing capacity, leaf tensile strength, leaf blade and stem moisture contents, and percent relative turgidity of leaf tissues were not significantly correlated with interspecies turfgrass wear tolerance.

15. The combined effects of leaf width and leaf tensile strength had a significant positive correlation with wear tolerance.

16. Sclerenchyma fiber and lignified cell contents based on percentages of the total cross-sectional area of leaves and
stems were directly proportional to the observed species wear tolerance.
SUMMARY

The results of this investigation have substantiated the association of various physiological, morphological, and anatomical characteristics with turfgrass wear tolerance. Cell wall constituents expressed on a mg per dm$^2$ basis accounted for 97% of the observed variation in wear tolerance for the species examined. Total cell wall content expressed on a weight per unit area basis accounted for 78% of this variation. Leaf width, leaf tensile strength, percent sclerenchyma fibers, and percent lignified cell also significantly contributed to wear tolerance. Many of the aspects such as verdure, shoot density, load bearing capacity, percent moisture content of leaf blades and stems, and percent relative turgidity of leaf tissues commonly associated with wear tolerance were found not to account for the variation observed in turfgrass species wear tolerance. Prior to this investigation, information of this type was not available in the turfgrass literature.

The information obtained in this investigation can be applied to develop criteria for selection of wear tolerant cultivars without utilizing a wear simulator or other wear device to determine
differentials. This would eliminate a considerable time factor involved in a mechanical wear testing program. A breeding program designed to delineate wear tolerant turfgrass cultivars could use the following criteria as a selection tool: a) total cell wall content expressed as mg per dm$^2$, b) leaf tensile strength, c) leaf width, d) percent sclerenchyma fibers, and e) percent lignified cell content. Wear tolerance differentials can be satisfactorily determined with these criteria. The total cell wall content expressed on a mg per dm$^2$ basis could adequately be applied to large-scale screening programs, offering satisfactory separation of species wear tolerance differentials.

Many aspects of turfgrass wear tolerance involving the effects of cultural, environmental, and species and cultivar factors could be studied utilizing the wear simulator and quantitative measures developed in this investigation. Some of the factors determined not to contribute significantly to the variation observed in wear tolerance among species may be of greater importance among cultivars of a single species. Additional testing in this area is needed. In addition studies involving cultivar differences in total cell wall content expressed as mg per dm$^2$ and wear tolerance should be conducted to complement the findings in this investigation. Studies of this nature
would validate the criteria for selection developed in this investigation.
LIST OF REFERENCES


