

## THE CAL-TURF METHOD OF CLIPPING UTILIZATION

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Turfgrass sod production in California goes on all year. This long growing season produces sod faster, but presents problems not apparent in other parts of the country. Our cultural practices include fumigation for control of diseases, insects, and weeds.

Irrigation is mandatory with only 8-10 inches of rainfall per year. Mowing cycles are determined by the rule of thumb "remove one-half of leaf area per cutting". This may be a four day cycle in the summer and two weeks in the winter. Clippings must be removed as there isn't enough time for complete breakdown and partially decomposed clippings degrade the appearance of the sod. Since we were removing an average of one million pounds of clippings per month from the bluegrass alone (60% of the acreage) we had a huge built-in disposal problem.

Research began in fall of 1969 and plots were established to evaluate clipping production and find a method of disposal. Clippings as a source of xanthophylls became the most promising use. Xanthophylls are part of the carotene fraction of green plants and are used in commercial poultry production to provide yellow color in egg yolks and the skins and fatty tissues of broilers. Kentucky bluegrass is normally quite high in xanthophylls.

All of the normal sod production cultural practices were re-evaluated for clipping and xanthophyll production. Pesticides were all screened for efficacy and residues. When a new cultural practice or a change in an old one looked promising a careful evaluation of the effects on clipping production and sod production was made.

One of the early steps in the research was to determine the types of xanthophyll present. Lab analyses found that 68% of the total xanthophylls were luteins which are considered biologically active as pigmenters, the remaining fraction was not. This was shown to be true in the first feeding trail. Xanthophylls were added by total xanthophyll analysis to a poultry ration. Alfalfa, the most important source of pigmentation, showed to be about 35% better pigmenter than bluegrass, even though bluegrass analyzed nearly three times the total xanthophyll content of alfalfa. In the next study the two products were added to a poultry ration on a straight weight basis. Bluegrass gave twice the pigmentation of alfalfa.

We began to analyze only for the biologically active xanthophylls using the "non-epoxy xanthophyll" analytical technique as described by Livingston, Nelson, Kohler in the Journal of the A. O. A. C. (1969). This technique now permits us to report to our customers just what the product will do for them.

Our field trials showed that optimum xanthophyll, protein, and clipping production could be achieved at 80 pounds of nitrogen per month fertilizer application. In the warm months of summer the rate of nitrogen could be cut in half. This optimum fertilizer rate even improved sod quality and slightly decreased production time.

Xanthophylls are quite unstable and oxidize quickly. A clipping harvest machine was developed which mows the turf and picks up the clippings in a single operation. Clippings are then transported to the dehydrator in a dump truck. The time from cutting to drying is easily held to less than an hour.

Dehydration techniques were studied, and temperature as well as heat exposure time determined. This data enabled the selection of dehydration equipment and overall design of the plant. During the past 1 1/2 years of operation experience has taught us much. We have found a point where research and practicality meet for efficient and economical production.