

# **Extension of Sod Shelf Life with LPE (Lysophosphatidylethanolamine)**

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## **INTRODUCTION**

The objective of the project was to evaluate the potential for lysophosphatidylethanolamine (LPE), a naturally-occurring lipid, to enhance sod shelf life by stabilizing membranes and reducing respiration rates. The study was funded by TPIF and the Wisconsin Sod Producers Association in 2000. One graduate student (Kurt Steinke) and one technical support staff member (Bryan Cantlon) were assigned to assist Dr. Stier with the project.

## **MATERIALS AND METHODS**

### Field trials

Plots consisted of 18-month old 100% Kentucky bluegrass located at Long Island Sod Farm in Marshall, WI. Treatments were laid out in a split-plot randomized complete block design with five replications. Plots measured 5ft. x 6ft. The soil was a silt loam. Vegetation was cleared and the ground was tilled prior to sodding.

Two sets of LPE rates were used over the course of five trials between June and October. For trials 1 and 2 a 5000-ppm stock solution was prepared using water and treatments of 100, 200, and 400 ppm were applied to the turf. In trials 3 and 4 rates of 60, 120, and 240 ppm were tested. For trial 5, the LPE was dissolved in a small amount of alcohol prior to preparing the stock solution. In trial 5, application rates were 100, 200, and 400 ppm. All treatments were applied with a CO<sub>2</sub> backpack sprayer equipped with 8010XR flat fan nozzle. Treatments for each trial were applied at 60 and 14 hours pre-harvest.

Sod was harvested between 10 am and 1 pm and placed onto three pallets. A commercial Brouwer harvester was used. Sufficient untreated sod was harvested in order to obtain a full pallet with the treated sod remaining on the bottom of the pallets. Two thermistors attached to "Hobo" dataloggers were placed near the center of each pallet and were used to monitor pallet temperatures.

Sodding time following harvest was another variable tested during the experiments. During Trials 1 and 2, sod was laid at 10 am and 3 pm the day following harvest and 10 am on Day 2. During Trial 3, sod was laid at 10 am and 3 pm 2 days after harvest and at 10 am on Day 3. During Trial 4, sod was laid at 10 am and 3 pm 3 days after harvest and at 10 am on Day 4. During Trial 5, sod was laid at 2 pm 3 days after harvest and at 8 am and 1:30 pm 4 days after harvest. One square foot of sod was placed in a rooting frame with the remaining sod being laid around the frame. Turf was irrigated daily by the farm manager for 1-2 weeks (weather dependent).

Two days after sodding a chlorophyll fluorometer was used to evaluate photosynthetic efficiency of the turf. Sod that recovers faster or suffers less shock from harvesting and stacking

should begin photosynthesis sooner, providing better color and rooting potential. Ten days after sodding, the turf in the rooting frames was pulled from the soil with a hydraulic sod-pulling device that measured the force (in Newtons) required to lift the sod. Turf strips were then rated on color (1=yellow/brown; 9=dark green; 6=acceptable) and quality (1=dead turf; 9=dense uniform/turf; 6=acceptable). Root quality was rated after the rooting frames were pulled (1=no roots; 5=highly rooted). Data were analyzed as a split-plot, randomized block with spray-harvest interval (14 or 60 hour) as mainplots and LPE treatment concentrations as sub-plots.

### Laboratory trials

These are planned for the winter of 2000-01. Due to timing of the award in 2000 we proceeded immediately with the field work. We will be evaluating the effects of both foliar and root-applications of LPE on turf resistance to heating. Foliar applications will be sprayed on the turf; root applications will be introduced either through hydroponics or by washing soil from the roots, cutting the roots, then spraying the underside of the turf with LPE. The turf will be subjected to controlled heat loads by placing the turf in a growth chamber at various temperatures for several lengths of time. Turf quality, chlorophyll levels, photosynthetic efficiency, electrolyte leakage, and turf regeneration in a greenhouse will be assessed.

## RESULTS AND DISCUSSION

We are still analyzing the data from the summer. Of the data we have analyzed, there has not been a consistent response from the LPE. Previous trials with tomatoes, cranberries, strawberries and flowers yielded dramatic effects with LPE significantly reducing respiration and senescence by depressing the enzymes involved with D1 protein and ethylene production. There are several factors that may have reduced potential effects of LPE in the 2000 field trials. 1) The rates necessary for a response in turf could be greater than those required for a response in other crops. 2) The LPE may not have been absorbed and/or translocated sufficiently to produce the anticipated effect. In about half the trials there was little dew formation the evening of application which would likely have facilitated the uptake if it had been present. As we learn more about LPE it is becoming apparent that translocation may be limited, particularly downward movement, in which case the LPE needs to be targeted more towards the crown rather than just the foliage. Most of the evenings were very cool which also could have reduced the uptake and translocation. 3) Most importantly, temperatures during the summer were unseasonably mild. Air temperatures were often no greater than the 70s (Fahrenheit). High temperatures inside the sod stacks on the pallets barely reached the high 80's/low 90's. This resulted in very little heat stress. As the season progressed, we left the sod on the pallets for increasingly longer periods of time in an attempt to allow heat buildup. The greatest result was some yellowing apparently due to lack of light for several days.

## FUTURE PLANS

We have submitted a proposal to repeat the field trial in 2001, hoping for more typical weather patterns. We intend to solubilize the LPE in alcohol prior to applications and to lightly irrigate the turf following LPE application in order to promote its uptake by the crown. Our growth chamber experiments should also provide some information about foliar versus root uptake and data from tightly controlled heating experiments.