Potential Benefits of Planting Trees Around Layer Farms

Bud Malone
University of Delaware

Presented at Texas Egg Clinic
March 29, 2006

Opportunities Using Trees for Vegetative Environmental Buffers

Industry Issues, Trends & Trees

Large farms, fans & neighbors
Rural encroachment + conflict/zoning

Emissions

Trees as Vegetative Filters

Goals of Vegetative Environmental Buffer (VEB)
1. Visual screen
2. Windbreak + Shade
3. Vegetative filter

Production Benefits
- Reduce airborne farm-to-farm disease spread
- Reduce cooling cost
- Maintain fan efficiency
- Reduce snow drifting
- Reduce heating cost
**Use Trees as Filters to Reduce Airborne Disease Transmission?**

- Between Farms
- Between Houses

**Between Farms**

**Trees as Filters Between Houses?**

**Between Houses on Same Farm**

**Layer House Inlets**

Inlets on Outside House
Inlets Between Houses
Between House Planting

These Austraes provide an effective windbreak after only two years!

Temperatures in Sun vs Shade

30–40 F

20 F

VEB to Reduce Backpressure on Fans

- 15 mph = 15.5% reduction in fan cfm and 4.4% increase in amperage.

Wind Speed 1/23/03

VEB to Reduce Backpressure on Fans

- VEB reduces wind directed toward fans & aids in maintaining fan efficiency

Temperature differential on E–W wooded farm compared to the E–W open farm.

- Implications of farms surrounded by dense woods:
  - Heat accumulation on S and W sides in warm weather
  - Although less wind chill in winter, may have colder night time air temperatures
**VEB Design Considerations for Poultry Farms.**

**Design Considerations:**
- Increase porosity (>spacing, deciduous trees, shrubs) on prevailing summer wind side of farms.
- Increase density (<spacing, evergreens, multiple rows) on winter wind side and opposite fans.

---

**Environmental Benefits**

- Reduce ammonia
- Reduce runoff
- Reduce groundwater nitrates
- Convert CO\textsubscript{2} to O\textsubscript{2}
- Low cost program to *partially* address future air quality & emissions challenges

---

**VEB Opposite Tunnel Fans**

"Reduces" Dust (49%), Ammonia (46%) and Odor (6%)

2002-2005 data

---

**Role of Windbreaks on Downwind Odor**

Without Windbreak

With Windbreak

---

**Wind direction and "openness" behind the VEB, "appears" to influence odor reduction**

- Soybeans in 2002 & 2004 (~28%)
- Corn in 2003 & 2005 (~0%)

---

**Neighbor Relations Benefits:**

- Creates positive image
- Landscape appearance & increase property value
- Blocks view of houses, waste facilities and routine farm activities
- Reduces odor, dust, feathers, noise, etc.
Human Population Growth (1990-2000) in Key US Poultry Counties

DMV Neighbor Relations Trends
- Increasing number of nuisance complaints and more stringent zoning ordinance.
- ~40% complaints are dust/feathers, 40% odor & 20% visual, noise, etc.
- Direction/location of tunnel ventilation a major issue.
- New proactive industry neighbor policy with bmp’s (includes VEB)

Capture Odor, Dust and Feathers
- Filtering exhaust air dust can reduce odors up to 65% (Hartung, 1989)

Provides Visual Screen
- Some People Smell with Their Eyes!!
- Out-of-Sight-Out-of-Mind!!
- Attractive farms have less odor*
* Mikesell, et. al., 2001

Fast Growing Trees for Immediate Benefits?
- These Austrees provide an effective windbreak after only two years!

Reduce Noise
- Growing nuisance complaint, particularly tunnel fans
- Reduces volume of noise by 50%
Technical Considerations for VEB

Work in Progress!!!!

Important

Select the right combination of trees that meets all 3 objectives of a tree program!

Develop tree plan before building poultry houses!

VEB Distance from Fans

- Fan efficiency decreased <4 times fan diameter
- Plume distribution 10 times fan diameter
- Planting distance near maximum plume distance ???
**VEB Too Close to Fans**

**Dust!**

**Distance May Depend on Tree Selection, Density and Arrangement of Plant Material**

**Selection of Plant Materials**

- Availability and cost
- House orientation
- Fan location
- Neighbors
- Obstructions and site limitations
- Soil type
- Low maintenance
- Personal preference

Select best “combination” for diversity in planting!

**Eastern White Pine**

**Advantages:**
Available, price, good density, attractive

**Disadvantages:**
Mortality from emissions!
Livability (soils, moisture stress, deer)

**Livability In High Emission Loading Areas**
**Eastern Red Cedar**

**Advantages:**
- Density, diverse soils, hardy

**Disadvantages:**
- Except seedlings, limited availability
- Mortality from particulates
- Some bagworms
- Some storm damage

---

**Spartan Juniper**

**Advantages:**
- Good density and growth
- Attractive
- Columnar shape

---

**Leyland Cypress**

**Advantages:**
- Available at low cost
- Attractive
- Good growth & hi emissions

**Disadvantages:**
- Mortality and maintenance issues!!!

---

**Green Giant Arborvitae**

**Advantages:**
- High emissions
- Available and reason cost
- Hardy and disease resistant

---

**Steed Holly**

**Advantages:**
- High emissions
- Resist particular matting
- Hardy and disease resistant

---

**Bald Cypress**

**Advantages:**
- Hardy and wind tolerant
- Good in wet areas
Hybrid Willow

Advantages:
- Fast growth!!!
- High emission, nutrient and moisture conditions

Disadvantages:
- Limited source and patent????

Rose Acre Complex (5 yrs)

Form of Plant Material

Seedling to B&B: Irrigation Essential!!

Hand: Time & Commitment

Irrigation Methods

- Drip: Installation, water use & placement
- Bury supply line and emitters: Effort & $$$
- Punch emitters and cover with poly/weed mat: Preferred

Weed Control Demo
Proper Design, Installation, Maintenance and Care!

Proper installation, water and weed control perhaps more important than plant form.

Hybrid Willow Planting in 2005

- Growth 1st summer was 6-10 ft with one mortality
- Expect complete screen within 3 yrs

Seek Assistance!

- Delmarva gets cost share (up to 75%) for site prep, plant materials, installation, irrigation, and maintenance.
- Texas, state EQIP funds for Windbreak/Shelterbelt Establishment (Ray Stoner, NRCS in Nacogdoches)
- Technical assistance in developing and implementing a tree plan is highly recommended!

Design VEB For Each Side of Each Farm And Try To Meet ALL Objectives

South
North
East
West
Summary
✧ Preliminary observations are encouraging, continue to better define this program
✧ Provides a long-term, low-cost, partial solution to emerging poultry industry issues (maybe one of most cost-effective BMP’s for emissions)
✧ Neighbor relations has driven interest (local/national/international)

Summary (cont.)
✧ VEB concept has been well received (national/international)
✧ Growers need technical assistance in designing & implementing a VEB
✧ Poultry companies becoming more aggressive in promoting (Delmarva companies will provide salary for tree program coordinator)

Questions