

# Barrier Treatment Methods Residential Mosquito Management Revisited

The Backpack Fogger is Obsolete

Dan Killingsworth



AMCA Co-Chair Endangered Species Act Sub-Committee

UF Master's Program Buckner Lab

Director of Operations

Environmental Security Pest Control

[ensec.net](http://ensec.net) [dan.killingsworth@pest.com](mailto:dan.killingsworth@pest.com)

# Barrier Treatments

Mosquito management of individual properties by private pest control operators primarily involves periodic backpack fogger applications.

Prominence of method is fairly recent.  
(20 years or so)

WNV awareness likely promoted the increased use of this method through mosquito management services.

Property perimeter shrubbery is the principal target for treatment as mosquitoes utilize foliage for resting sites.





# Barrier Treatments

An ideal treatment delivers the product with an optimum mean droplet range of 60-220 microns (water-based products) for residual deposition on the top and underside of the leaf while minimizing the potential for drift.

Treatment should be within the vegetation where the mosquitoes are utilizing the protected space as resting sites.

Exterior of vegetation is where majority of flowering occurs.

Non-target concerns must be addressed.



# Recommendations

“Barrier and residual sprays can provide long-lasting control of adult mosquito populations and should be focused on structures, when possible, to avoid nontarget effects.”

“While most barrier application studies have focused on urban container-inhabiting mosquitoes, there have been a number of studies looking at barrier applications on controlling Culex populations with mixed results, and thus, are generally not recommended.”

## BEST PRACTICES FOR INTEGRATED MOSQUITO MANAGEMENT



# Conventional Treatment

Stihl SR 200 gas powered backpack fogger

Retrofitted leaf blower

Gravity-fed product delivery

- Can be modified with pump but not standard

Airflow- 341 cfm

Droplet Volume Mean Diameter at 10 ft 153 microns

Weight 18.7 lbs (without payload)



CONTAINER CAPACITY	2.1 gal.
MAXIMUM SPRAY RANGE	29.5 ft.
AIR VOLUME	341 cfm
ENGINE POWER	1.07 bhp
FUEL CAPACITY	36.5 oz.
DISPLACEMENT	27.2 cc

# Alternative Method



NPD Boss Eliminator E320 18-volt backpack sprayer

Specialized Sprayer wand and pressurized nozzle  
Critical industry standard value

Droplet Volume Mean Diameter at 10 ft 190.12 microns

Weight- 10.5 lbs (without payload)

Distance from Spray Nozzle (ft.)	Relative Span	Dv 0.1 (µm)	Dv 0.5 (µm)	Dv 0.9 (µm)	Average Percent Coverage (%)	Average Droplet Density (droplets/cm <sup>2</sup> )	Average Volume Density (gal/ac)	Average Volume Density (oz/100 sq ft)
5	1.00	267.00	504.98	775.00	9.67	76.66	15.51	4.56
10	1.04	190.12	341.68	546.26	7.04	74.85	8.02	2.36
15	1.01	141.76	255.26	405.65	4.57	59.30	4.44	1.30
20	0.89	143.61	235.05	353.06	3.00	42.34	2.50	0.73





# Treatment Target

Treatment within the vegetation where mosquito resting areas are reported should be the principal target site.

Backpack foggers by design require treatment from the exterior of the vegetation. Difficult to consistently deliver product to interior.

Flowering occurs primarily on exterior of plant. (treatments should avoid flowering phase, even flower buds)





# Room to Maneuver

Volume of open space within “crown” of shrub or bush is often quite spacious (species dependent)

Backpack sprayer treatment wand is easy to manipulate within this space to deliver product to underside of foliage with high degree of accuracy.

This method is not possible with backpack fogger





# Property Line Limits

The main area of focus for barrier treatments is the vegetation along property lines. The target is often quite close to the neighboring property.

The velocity of airflow from backpack foggers required to shear the chemical droplet to an adequate size and propel the product to the intended deposition target thrusts a significant percentage of the treatment cloud to unintended sites.

“Chemical trespass” to neighboring property can result.

The backpack sprayer wand design allows for directed treatment with surprising accuracy.





# Visualizing Treatments

Utilization of “training wall” to visualize and understand spray patterns.

Develop feel for rate of travel when treating.

Avoiding “run-off” on vertical surfaces minimizes over usage.

Calibrate personalized method.

Train to avoid obstacles, maintain footing, and maintain distance.

Ergonomic techniques developed





# Understory Treatments

Treating the underside of shrubbery is difficult with a backpack fogger as the limited length of nozzle does not allow for sufficient reach. (delivery point also close to applicator)

Resulting airflow pushes down on foliage which hinders product deposition to the interior of vegetation and underside of leaves. (grooming method of vegetation directly affects treatment)

Inevitable overspray to surrounding ground. (pet concerns for re-entry period post treatment)

The extended wand of the backpack sprayer positions the specialized sprayer nozzle at the proper angle to treat the underside of the foliage within the vegetation.





# Treatment Limitations

The backpack fogger requires a set-back distance from treatment zone. Windy conditions (Greater than 6-8 mph) make treatments difficult and unadvisable.

Less control of application to target site.

Increased chances of product blown back on applicator.

Backpack sprayer is less impacted by windy conditions and extends treatment opportunities (within reason).





# Treatment Limitations



# Treatment Evaluation

As a means of evaluating the delivery method for barrier treatments (Bifenthrin at 1 oz/gal), over 200 residential mosquito service accounts were compared using the Stihl 200 backpack sprayer (100 sites) and the NPD Eliminator E-320 backpack sprayer (100 sites). Parameters assessed:

- **Droplet size target deposition:** There is greater deposition within the vegetation resting sites with the NPD sprayer than the Stihl fogger. The work previously performed by Leading Edge gives a droplet spectrum analysis for the NPD sprayer that translates to deposition within the vegetation. The desirable droplet spectrum for the Stihl backpack fogger requires a set back distance for treatment that reduces deposition within the ideal resting site treatment zone.
- **Non-target drift:** The Stihl backpack fogger delivered product over a wider range of non-target areas than the NPD sprayer. The treatment method with the NPD sprayer of starting within the vegetation limits drift outside the target area.



# Treatment Evaluation

- **Time per service:** The NPD backpack averaged approximately 2.5 minutes longer per property than the fogger. This could be a function of the speed of the technician, but it is also attributed to the additional areas that can be treated around the structure that are off limits to fogging.
- **Volume of product used:** The NPD sprayer averaged an additional gallon of finished product than the fogger. This is attributed to additional treatment areas available with the NPD sprayer.
- **Re-service requests\*** : This was equal for both treatment platforms and was mostly a function of customer perception after a rain event shortly following a treatment.

The NPD Eliminator E-320 proved operationally superior or on par with the Stihl 200 fogger in every category.

\*Re-service requests mostly driven by precipitation shortly after service completion for both application methods. Customer bias difficult to discern. Property dynamics highly variable. CDC light trap surveillance performed after re-service request when possible.

# Operational Assessment

From an operational perspective, the backpack sprayer is a superior application platform compared to the backpack fogger.

Treatment placement is a principal concern.

Additional product volume and treatment time by sprayer vs fogger due to extension of treatment zones that allowed for greater coverage where desired around structure. (AMCA Barrier Treatment BMPs-...)

Ergonomic considerations factor heavily. (Safety and occupational injuries)

Removing backpack fogging as treatment method.

**Adopting NPD backpack sprayer as sole delivery method for mosquito barrier work.**



# Thank You!

## Q & A

Dan Killingsworth  
Director of Operations  
Environmental Security Pest Control  
ensec.net dan.killingsworth@pest.com

UF Master's Program  
Buckner Lab

**UF | IFAS**  
UNIVERSITY of FLORIDA  
Florida Medical Entomology Laboratory