Council of
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of Agrotechnology

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# CPDA Application Enhancement Certification Program
# Rationale & Protocol for Testing V3-19-22

**Background and Rationale**

Industry began promising a drift reduction program to guide applicators in 2001 and the DRT Task Force was formed. As interest grew, so did the number of stakeholders and eventually progress stalled. Since the EPA's launch of a "Voluntary DRT program" in 2016, little has been achieved. The program was ultimately too narrowly focused on drift reduction, ignored the possible negative impact on biological efficacy, and lacked incentives to participate.

After 20 years of waiting, applicators still need and want guidance in making more efficacious and on-target applications. To meet this industry need, and at the urging of academia, CPDA began socializing the concept of an Application Enhancement Program in 2019. The proposed program recognizes that drift control without biological efficacy is not a successful application and is designed to provide a more complete picture of the likely outcome of the application. This is achieved by highlighting the positive interactions between pesticide formulation type, various nozzle designs and adjuvant selection. The information provided through this program will provide applicators with an easy to understand visual of how to best manage nozzle and adjuvant selection based on the formulation type of the pesticide to be applied.

**Objective and Disclaimers**

This document outlines the rationale and initial protocol for the launch of CPDA's Application Enhancement Program (AEP). The data collected is a factual finding of how various application parameters affect droplet size and the data represents the actual droplet size distributions for each treatment. In no way should the data generated be used to supersede the label requirement for a given pesticide or adjuvant.
Neither participation in the Application Enhancement Program, the data collected, nor the information generated, by the testing be considered or implied as an endorsement of any product by CPDA.

**Prerequisite**

Products submitted for testing must be a CPDA certified adjuvant, or in the certification process, and make claims of improving deposition and / or reducing drift.

**Approved Testing Facilities**

While it is desirable in the future for more than one facility to be approved for testing, much work remains to be done to in this area to develop a computer program capable of normalizing data generated at different locations and / or different droplet measurement techniques. Therefore, at the launch of this program the only approved / designated testing facility is:
**University of Nebraska-Lincoln**
**Pesticide Application Technology Laboratory**
**West Central Research, Education and Extension Center**
**North Platte, Nebraska**

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**Selected Nozzle Designs**

There are currently four nozzles to be used in this testing. These nozzles represent the primary nozzle designs most commonly used in ground applications of crop protection products. Included nozzle designs are single orifice flat fan nozzle, turbulence chamber nozzle, air-inducted flat fan nozzle and an air-inducted turbulence chamber nozzle. Additional nozzles may be approved and added in the future.

**Selected Pesticide Formulations**

Four of the most widely utilized pesticide formulations are Soluble Liquids (SL), Emulsifiable Concentrates (EC), Suspension Concentrates (SC) and Water Dispersible Granules (WDG). Literature results show that SC and granule formulations have minimal impact on the spray droplet spectrum. However, the inert systems in both SL and EC formulations play a significant role on influencing droplet spectrum as well as interacting with various types of spray modifier agents.

Based on this, the following four pesticides were chosen to represent the different formulation types that have the greatest influence on spray droplet spectrum:

- Headline® (EC)
- Liberty® (SL formulated with anionic surfactant) or a suitable replacement
- Roundup PowerMax® (SL formulated with cationic surfactant) or a suitable replacement
- Shredder® Amine 4 (SL with minimal inerts/adjuvancy) or a suitable replacement

**Droplet Spectra Range and Depiction of the Data**

Industry experts have concluded a specific spray droplet size range to be "effective" for ensuring deposition and retention of the spray solution on plant leaf surfaces. That range is between ~160 µm to ~840 µm

Based on this established range of the volume of spray droplets, the "droplet spectra pictogram" below will be used to simply communicate the test result highlights for each nozzle, pesticide formulation type and adjuvant combination. Either a positive, negative or neutral result could be depicted.

- Top number represents percentage of spray volume in "effective" range.


- A positive percentage variance from the control. In this example, there is a 7% increase in spray volume determined to be in the "effective" range. Calculated as: (*Control = 91. Results = 97. 97-91=6. 6/91=0.0659 .0659 -> 7%)*

- A negative variance from the control. In this example, there is an 8% decrease in the "effective" range. Example: (*Control = 62. Results = 57. 57-62=-5. -5/62=.0806. .0806. -> 8%).* This could guide the applicator to select an alternative, more effective, nozzle / adjuvant combination for this particular pesticide formulation type and application.

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**Use of Data**


For consistency, this is the only acceptable format for portrayal of the data generated under the Application Enhancement Certification Program. Any and all use of this data must be accompanied by its Unique Test ID Number.

All data for a specific product is the property of the applicant and may only be used by the applicant. Applicant may use all or any part of the applicant's product data in marketing materials with citation that data was generated under the CPDA Application Enhancement Certification Program and the Test Identification number assigned by the Wind Tunnel report.

Applicant agrees to allow CPDA to post the basic protocol results as shown in the "droplet spectra pictogram" matrix below. At the applicants discretion, applicant may allow CPDA to post data for other nozzles the applicant has tested under the program.

| | XR11004 single orifice flat fan | TT11004 turbulence chamber | AIXR 11004 air induction flat fan | TTI 11004 air inducted turbulence chamber |
|---|---|---|---|---|
| Loaded Cationic Soluble Liquid (SL) Ex: glyphosate | 86% +17% | 93% + 9% | 97% + 7% | 73% +20% |
| Loaded Anionic Soluble Liquid (SL) Ex: glufosinate | 75% +12% | 89% +15% | 93% + 4% | 57% - 9% |
| No-load Soluble Liquid (SL) Ex: 2,4-D amine | 90% +12% | 92% +12% | 97% +12% | 79% +12% |
| Emulsifiable Concentrate (EC) Ex: pyraclostrobin | 81% +12% | 91% +12% | 95% - 5% | 55% - 18% |

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**Identification & Retention of Data**

Both CPDA and the Applicant will retain a copy of the actual test results for a period of no less than 7 years after the products lifespan has expired. Data will be stored by Company name and Test identification number.

**Application Instrument and Conditions**

Four nozzles and a total of twenty spray solutions are to be analyzed with a Sympatec Helos Vario KR laser diffraction, particle size analyzer in a low speed (15 mph air flow) wind tunnel. With the R7 lens installed, it can detect particle sizes ranging from 18 to 3500 microns.

The settings below represent the "standard" measurement conditions established by the UNL PAT lab and its cooperators over the past decade and are likely to differ from other cooperating faculties. Additional procedures are being developed and verified for review and potential inclusion by CPDA that will allow for data from any cooperating facility to be adjusted to ensure consistent, relative comparison to all other data accepted as part of this program. The current protocols will be updated upon successful completion of the above-described activities.

**Recommended Climatic data and instrument used during testing**

| Metric | Data |
|---|---|
| Wind speed (mph) | 15 |
| Temperature (°F) | ~ 70-75 |
| Relative humidity (%) | ~ 60-70 |
| Measurement distance (in) | 12 |
| Particle size analyzer | HELOS KR with R7 |
| Replicated measurements per treatment | Minimum of 3 |

**Protocols**

1. Nozzles & pressure selections:

   The four Spray System Company nozzles used for this protocol are:

   - XR11004
   - TT11004
   - AIXR11004
   - TTI1104.

   All nozzles will be operated at 40 psi.

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**Protocols (con't)**

2. Pesticide formulations:
   The following four pesticides, that represent different formulation types, are to be tested in combination with each of the above nozzles with and without a candidate adjuvant to gain a full understanding on the adjuvant impact on the spray quality:
   - Headline® (Emulsifiable Concentrate) at 0.625% v:v
   - Liberty® (Loaded Anionic SL) at 2.5% v:v
   - Roundup PowerMax® (Loaded Cationic SL) at 2.5% v:v
   - Shredder® Amine 4 (Non Loaded SL) at 2.5% v:v

3. Treatment list, products, use-rates and abbreviations

| Trt | Solution | Rate (%v:v) | Nozzle |
|---|---|---|---|
| 0 | DI Water | 0 | XR11004, TT11004, AIXR11004, TTI11004 |
| 1 | Emulsifiable Concentrate (Headline) | 0.625 | XR11004, TT11004, AIXR11004, TTI11004 |
| 2 | Emulsifiable Concentrate + Adjuvant | 0.625 + A | XR11004, TT11004, AIXR11004, TTI11004 |
| 3 | Loaded Anionic SL (Liberty) | 2.5 | XR11004, TT11004, AIXR11004, TTI11004 |
| 4 | Loaded Anionic SL + Adjuvant | 2.5 + A | XR11004, TT11004, AIXR11004, TTI11004 |
| 5 | Loaded Cationic SL (Roundup PowerMax) | 2.5 | XR11004, TT11004, AIXR11004, TTI11004 |
| 6 | Loaded Cationic SL + Adjuvant | 2.5 + A | XR11004, TT11004, AIXR11004, TTI11004 |
| 7 | Non Loaded SL (Shredder) | 2.5 | XR11004, TT11004, AIXR11004, TTI11004 |
| 8 | Non Loaded SL + Adjuvant | 2.5 + A | XR11004, TT11004, AIXR11004, TTI11004 |

**DATA Generation and Review Process**

1. The initial phase of the AEC program will consist of executing the above protocol at the University of Nebraska-Lincoln, Pesticide Application Technology Laboratory with the four selected nozzles and four pesticide formulations, in combination with a single candidate adjuvant.

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**DATA Generation and Review Process (con't)**

2. In addition to the test combinations presented above, each candidate data set should also include droplet size distribution data for the ASABE S572.3 reference nozzles and the specified reference operating pressures (see following table). NOTE: The newest version of S572 (version 3) uses updated pressure for the three coarsest classifications.

| Classification | Nozzle | Reference Pressure (psi) |
|---|---|---|
| VF / F | 11001 | 65.3 |
| F / M | 11003 | 43.5 |
| M / C | 11006 | 29.0 |
| C / VC | 8008 | 31.9 |
| VC / XC | 6510 | 17.4 |
| XC / UC | 6515 | 14.5 |

Measurements should be made under the same conditions and protocols as all program candidate treatment data but using water only in combination with the reference nozzles.

3. The proposed data output format is:

Date, Time, Measurement Range, Optical Conc., Solution, Nozzle, Orientation, Orifice, Pressure, Airspeed, Measurement Distance, Rep, DV10, DV50, DV90, %<30um, %<50um, %<80um, %>100um, %>141um, %>150um, %>200um, %>730um , Ch 1, Ch 2, Ch 3, Ch 4, Ch 5, Ch 6, Ch 7, Ch 8, Ch 9, Ch 10, Ch 11, Ch 12, Ch 13, Ch 14, Ch 15, Ch 16, Ch 17, Ch 18, Ch 19, Ch 20, Ch 21, Ch 22, Ch 23, Ch 24, Ch 25, Ch 26, Ch 27, Ch 28, Ch 29, Ch 30, Ch 31

Each candidate adjuvant data distribution set will be segregated to their respective AEP Classification categories based on the actual reference nozzle data provided. The three AEP Classifications categories are:

- % Too Small - % of spray volume less than ~160 µm
- % Effective - % of spray volume between ~160 µm to ~840 µm
- % Too Big - % of spray volume greater than ~840 µm

All Applicant data will be transferred from the approved / designated test facility to the Applicant and CPDA Certification Committee Chairman.

4. Test results will carry a unique Test Identification number that will be used for reference purposes and record retention.

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**DATA Generation and Review Process (con't)**

5. From here, visual representation of the results for each candidate product can be established and "droplet spectra diagrams" constructed by the AEC Data Quality Assessment Committee under direction of the CPDA Certification Committee Chairman.

6. Once the "droplet spectra pictograms" are constructed and the matrix assembled, the matrix and a Letter of Authorization (LoA) will be provided to the Applicant. With the execution and return of the LoA, Applicant agrees to CPDA posting of the authorized data and Unique Test ID Number. CPDA agrees and provides the Applicant with license to use appropriate marks identifying the product as an Application Enhancement Certified adjuvant.

7. Final diagram posted to CPDA website.

8. Warranty Disclaimer. The following will be displayed on the CPDA website containing the Application Enhancement Certification information. Additionally, the Applicant agrees to include the Warranty Disclaimer below in all Applicant marketing materials where the "droplet spectra pictogram" and / or matrix is shown:


ALL information contained herein IS PROVIDED "AS-IS", AND both CPDA and *Company Name* hereby expressly disclaim any and all REPRESENTATIONS and WARRANTIES WITH RESPECT TO the INFORMATION contained herein, WHETHER EXPRESS OR IMPLIED BY LAW OR OTHERWISE, INCLUDING, without limitation ANY WARRANTY OF COMPLETENESS OR ACCURACY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR USE OR WARRANTY OF MERCHANTABILITY. Neither CPDA nor *Company Name* SHALL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES ARISING OUT OF USE OF THE INFORMATION contained HEREIN.

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**Testing Schedule**
To effectively manage both work-load and costs, Application Enhancement Certification testing will be done twice each year. Submissions, samples and any additional nozzles to be tested need to be in-place at the designated wind-tunnel by March 1st or September 1st of each year.

**Base Test Protocol - Minimum**
The applicant is responsible for the cost for testing each candidate adjuvant at the University of Nebraska-Lincoln, Pesticide Application Technology Laboratory. The cost for testing each candidate adjuvant is as follows:

$4,800 for the standard four nozzles and pesticide formulations specified in the base protocol.

To minimize costs to the applicant, CPDA reimburses the University of Nebraska-Lincoln, Pesticide Application Technology Laboratory for the cost of testing the controls in the base protocol.

**Base Test Protocol plus Additional Nozzles Prior to Certification**
At the Applicant's discretion, additional nozzles may be tested during the initial Base Protocol testing. Each additional nozzle tested during the initial testing of the base protocol will incur an additional cost of $1,000. 1 nozzle X (4 pesticide formulations + 4 controls).

**Additional Nozzles Tested Post Certification**
Applicants may submit to have additional nozzles tested after the Applicant's product is Certified. Each nozzle tested during in this situation will incur a cost of $1,600. 1 nozzle X (4 pesticide formulations + 4 controls).

**Application Enhancement Certification Fee Structure**
Application and Renewal fees are listed below. Application fees are due once a product is approved for CPDA Certification and provides certification for a period of three (3) years. A Renewal Certification process is conducted and invoiced every 3 years after the initial approval.

| | Initial Certification | Sub-Certification |
|---|---|---|
| CPDA Members | $500 | $250 |
| Non Members | $750 | $500 |

| | Renewal | Sub-renewal |
|---|---|---|
| CPDA Members | $250 | $125 |
| Non Members | $500 | $250 |

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*A product may be subject to a re-certification fee if a chemical or compositional change of the product impacts one or more of the voluntary standards, or if new information or manufacturing changes impact the toxicity profile of the product.*

**Additional Obligations of the Applicant**

1) Assurance of Formulation Integrity. Applicant acknowledges that formulation changes can affect product performance characteristics and the test results generated under Application Enhancement Certification testing protocol. Applicant therefore assures CPDA that no change to the Certified Product formulation will be made in respect to the amounts of each specific ingredient and the only allowable substitutions are for components that carry the same CAS number.

2) Formulation Change. In the event that a formulation change is desirable or unavoidable, Applicant agrees to notify CPDA 30 days prior to implementing that change. Applicant also agrees surrender the Application Enhancement Certification for the product and to cease use of the Certification mark on all packaging and promotional items. Applicant also agrees that CPDA will remove the product from any and all lists of Application Enhancement Certified products.

3) Notification of Cancellation or Discontinuation. Applicant agrees to notify CPDA no later than 60 days prior to the Certification Renewal date. CPDA agrees to remove the product from any and all lists of Application Enhancement Certified products at the renewal date.