

CPDA Application Enhancement Certification Program Rationale & Protocol for Testing v8-8-22

Background and Rationale

Pesticide application stewardship and training are a continued need within the agricultural industry. Programs in the past focused narrowly on control of drift, rather than optimization of an application based on nozzle and product selection. These programs sparked interest but did not result in a tangible path forward.

Applicators are hungry for 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 Certification 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 pesticides to be applied.

Objective and Disclaimers

This document outlines the rationale and initial protocol for the launch of CPDA's Application Enhancement Certification (AEC). 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 Certification 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.

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 WCREEC
Pesticide Application Technology (PAT) Laboratory
West Central Research, Education and Extension Center
North Platte, Nebraska**

Selected Nozzle Designs

There are currently four nozzles to be used in the base protocol testing. These nozzles represent the primary nozzle designs most commonly used in ground applications of crop protection products. Included nozzle designs are a single orifice flat fan nozzle, a turbulence chamber nozzle, an air-induced flat fan nozzle and an air-induced 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) or a suitable emulsifiable concentrate replacement
- 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. The representative effective droplet size range included in the AEC is between ~160 µm and ~840 µm microns.

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, the use-rate tested, 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: $(Control = 91. Results = 97. 97-91=6. 6/91=0.0659 .0659 \rightarrow 7\%)$
- A negative variance from the control. In this example, there is an 8% decrease in the “effective” range. Example: $(Control = 62. Results = 57. 57-62=-5. -5/62=0.0806. 0.0806 \rightarrow 8\%)$
This could guide the applicator to select an alternative more effective, nozzle / adjuvant combination for this particular pesticide formulation.



Droplet Spectra Range and Depiction of the Data (con't)

- A variance from the control (positive or negative) that is not statistically different from the control will be depicted in dark grey. This will avoid false beliefs in 'positive effective' choices and addresses the 'causes no harm' spectrum of registrant product entries.



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 and the certified use-rate.

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.

AEC #: HA 5-16-22 REAL NIS/DRT™ @ 0.25% v/v	XR11004 single orifice flat fan	TT11004 turbulence chamber	AIXR 11004 air induction flat fan	TTI 11004 air induced turbulence chamber
Loaded Cationic Soluble Liquid (SL) Ex: glyphosate	70% + 8%	86% + 6%	88% + 4%	70% - 2%
Loaded Anionic Soluble Liquid (SL) Ex: glufosinate	60% + 2%	80% + 7%	82% 0%	70% - 1%
No-load Soluble Liquid (SL) Ex: 2,4-D amine	72% + 2%	85% + 1%	87% + 3%	67% + 1%
Emulsifiable Concentrate (EC) Ex: pyraclostrobin	81% + 9%	87% + 2%	88% + 4%	72% +13%

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 facilities. 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
- TTI11004

All nozzles will be operated at 40 psi.

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 or Tap 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.

DATA Generation and Review Process (con't)

- In addition to the test combinations presented above, each candidate data set will 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.

- 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.

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

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. This is for placement and example of intent only. CPDA needs its own legal counsel to draft this statement.

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 **May 1st** and **November 1st** of each year.

CPDA will issue a reminder to members and industry 45 days prior to the May 1st and November 1st deadlines.

Sample Submissions for University of Nebraska WCREEC

Samples may be submitted by completing the *CPDA Application Enhancement Certification Program / University of Nebraska Submission Form*. See attached document.

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).

Payment for Services

Based on the fees identified above, the applicant is responsible for all testing expenses incurred from their submissions. Payments are due upon invoice receipt from the University of Nebraska-Lincoln, Pesticide Application Technology (PAT) Laboratory.

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	\$1000	\$1000
Non Members	\$1250	\$1250
	Renewal	Sub-renewal
CPDA Members	\$ 500	\$ 500
Non Members	\$ 625	\$ 625

A product may be subject to a re-certification fee if:

- 1) A chemical or compositional change of the product impacts one or more of the voluntary standards
- 2) New information changes the toxicity profile
- 3) A change in manufacturing process alters the chemical characteristics of the product.

Use of Marks and Additional Obligations of the Applicant

- 1) The only appropriate marks for packaging, labels and promotional materials is the CPDA Certified Logo with the assigned QR code. This logo will identify products as having met both standards. Additionally, the QR code will direct users to the CPDA website to review the “droplet spectra pictogram” matrix and identify the certified use-rates
- 2) It is recommended that the following label language be used to refer users, “CPDA Application Enhancement Certified: Use the QR code to see selected nozzle/rate combinations for optimized applications.”
- 3) 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.
- 4) 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.
- 5) 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.





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