Validation Brief & Deliverable Specification

From Drone Flight to Audited Stand Counts, 50% Bloom Dates & Canopy Height Tables

01 / EXECUTIVE SUMMARY

Breeders, research agronomists, and Contract Research Organizations (CROs) need plot-indexed phenotypic tables ready for ANOVA, mixed-model BLUPs, and variety advancement decisions in R, SAS, Agrobase, or BMS -- not raw software homework. Dakota Agros converts stitched sUAS orthomosaics (GeoTIFF) and plot boundary maps into human-audited stand counts, intra-row gap metrics, R5 reproductive bloom counts, interpolated 50% bloom dates, and canopy height summaries.

02 / PEER-REVIEWED FIELD VALIDATION (OLSON ET AL., 2024 - AGRONOMY JOURNAL)

Published benchmark across 877 sunflower plots spanning three 2021 yield trials in Moorhead, Minnesota (doi:10.1002/agj2.21655). Drone-measured bloom percentages were evaluated directly against independent ground-rated 50% bloom field notes.

90% / 94%

Bloom-Stage Agreement

793 of 877 plots matched ground calls with a 50% rule; 94% on held-out trials after single-trial threshold calibration.

83 of 84

Timing Boundary Misses

Nearly every disagreement occurred within +/- 2 days of the plot's ground-observed 50% bloom date (timing, not misreads).

0.8 Days

50% Bloom Date MAE

With flights spaced 6 days apart, interpolated 50% bloom dates landed within 0.8 days on average (92% within 2 days, n=264).

03 / HUMAN-IN-THE-LOOP QA AUDIT PROTOCOL

1. Center-Row vs. All-Row Isolation: Detections are spatially assigned to measured plot interiors so adjacent-plot border rows and alley weeds never inflate stand or bloom counts.

2. Intra-Row Gap Quantification: Contiguous emergence skips are measured along each row to report Row_Gap_Pct alongside plant counts for early replant or vigor scoring.

3. Edge-Case Review Before Lock: Low-confidence detections, occluded canopies, and boundary overlaps are inspected inside the HelioVision workbench prior to CSV/GeoJSON export.

4. Data Sovereignty & IP: Clients retain 100% ownership of all raw orthomosaics, shapefiles, and exported plot-level tables.

04 / STANDARD CSV & GEOJSON DELIVERABLE SCHEMA

Every package includes Moorhead_Trial_Plot_Summary.csv (R / SAS / Agrobase ready) and georeferenced GeoJSON polygon layers compatible with QGIS and ArcGIS Pro:

Deliverable Field(s)	Format	Agronomic Use
Plot_ID, Range, Row, Entry_ID	String / Integer	Trial experimental unit identifiers matching client field book
Flight_Date, Growth_Stage	ISO Date / Stage	Acquisition date (YYYY-MM-DD) and crop growth stage (V6, R5)
Center_Row / All_Row_Stand_Count	Integer count	Middle-row yield stand isolated from full-plot border counts
Row_Gap_Pct	Float (0-100%)	Percentage of row length with emergence skips beyond threshold
Bloom_Count_R5, Pct_In_Bloom	Integer / %	Detected open reproductive capitula and percent of stand in bloom
Est_50Pct_Bloom_Date	ISO Date	Interpolated 50% bloom date across multi-pass flights
Mean_Canopy_Height_m, QA_Flag	Meters / Enum	Normalized photogrammetric canopy height and human QA status

05 / CROP & TRAIT READINESS MATRIX

Crop Group	Target Phenotypic Traits	Deployment Status
Sunflower	V-stage center-row stand count, row gap %, R5 open-bloom count, interpolated 50% bloom date, canopy height (CHM)	**Turnkey Production (877 plots validated)**
Canola & Pulse Crops (Soybean, Dry Bean, Pea)	Early emergence stand count, canopy closure rate, flowering duration (Canola), physiological maturity / senescence	**Guided Pilot Ready (1-flight calibration)**
Row Crops & Sugarbeet (Corn, Sugarbeet, Potato)	Emergence plant counts, skips/doubles & row-gap %, canopy relief/height, late-season root/stalk lodging %	**Guided Pilot Ready (1-flight calibration)**
Custom Visual Targets	Disease lesions, weed escapes, forestry & ecological surveys	**Custom Workbench Pilot**

06 / WINTER OFF-SEASON OFFER: TEST EXISTING ARCHIVAL IMAGERY

Have unanalyzed GeoTIFF orthomosaics sitting on a hard drive? Send one stitched trial orthomosaic and plot boundary shapefile (plus ground notes for a blind accuracy check) before budgeting for next season:

* Interactive Browser Workbench: Inspect 16 live multi-crop trials & 29 validated models at dakotaai.us/agros/workbench.html.
* $500 Full-Trial Validation Report: Complete audited CSV + GeoJSON table and ground-note comparison (100% creditable).
* $1,500 Guided Pilot | $3.50 - $6.00 / plot-pass Turnkey Managed Processing | Custom Workbench Licensing.