DAKOTA AGROS · FIELD TRIAL PHENOTYPING

Validation Brief & Deliverable Specification

Stand counts, open-bloom counts and 50% bloom dates from drone orthomosaics, checked against field notes.

01 / WHAT WE DELIVER

Breeders, research agronomists and CROs need plot-indexed tables they can load into R, SAS, Agrobase or BMS. Dakota Agros turns stitched sUAS orthomosaics (GeoTIFF) and your plot map into plot-level stand counts, open-bloom counts, percent in bloom and interpolated 50% bloom dates, with every detection delivered as a GeoJSON layer you can inspect in QGIS or ArcGIS Pro. Plots the checks flag are reviewed by a person before the table is locked.

02 / VALIDATION AGAINST FIELD NOTES (2021 MOORHEAD SUNFLOWER TRIALS)

Raw, unadjusted drone output from three 2021 yield trials at Moorhead, Minnesota (879 plots) was compared with ground-rated 50% bloom notes. Flights and ground notes were not always taken on the same day. These are Dakota AI internal results, not a published study.

86% / 94%

Bloom-call agreement. A 50%-in-bloom rule matched ground ratings on 86% of 1,758 plot-by-flight calls, and on 94% of plots for the clearest flight (Aug 5).

0.8 days

50% bloom date error, Early trial. With flights six days apart, interpolated dates were within 0.8 days of field notes on average; 92% of 264 plots within 2 days.

2.5–3.4 days

With 12-day flight gaps. On the two trials where key flights were 12 days apart, the average error rose. We set flight spacing during scoping so flights bracket 50% bloom.

Our founder's peer-reviewed sunflower research: Olson, N., Trostle, C., Meyer, R., & Hulke, B. S. (2024). Canopy closure, yield, and quality under heterogeneous plant spacing in sunflower. *Agronomy Journal*. doi:10.1002/agj2.21655.

03 / QUALITY CHECKS BEFORE A TABLE IS LOCKED

1. **Plot assignment.** Each detection is assigned to the plot that contains its center, so alley weeds and neighbor-plot plants do not inflate counts.
2. **Duplicate removal.** Objects found on two overlapping image tiles are merged so each plant or bloom is counted once.
3. **Across-date carry-forward.** Maps from every flight are aligned to one reference flight. Bloom counts never drop between flights because a head turned or drooped, and each such change is flagged.
4. **Flags for review.** Plots with more blooms than plants, no 50% crossing between flights, or a bloom date far from your notes are flagged and reviewed by a person.
5. **Your data stays yours.** You keep full ownership of your imagery, plot maps and exported tables.

04 / SAMPLE DELIVERABLE: CSV FIELDS

The sample ZIP contains Moorhead_Trial_Plot_Summary.csv and Moorhead_Sample_Detections.geojson for 24 real plots of the 2021 Moorhead Early trial, two flights each (Aug 5 and Aug 11). It is raw model output; on that sample, interpolated 50% bloom dates averaged 1.1 days from field notes, with 90% of plots within 2 days.

Field	Format	Meaning
Plot_ID, Trial, Range, Row	String / Integer	Plot identifiers; in a project these match your field book
Flight_Date, Days_After_Planting	ISO date / Integer	When the flight was taken
Stand_Count, Stand_Source	Integer / String	Plants counted in the plot, and which flight the count came from
Open_Bloom_Count_Raw, Open_Bloom_Count	Integer	Blooms detected on this flight, and the count after carry-forward
Pct_In_Bloom	Percent	Open_Bloom_Count / Stand_Count × 100
Est_50Pct_Bloom_Date	ISO date	Interpolated between the flights that bracket 50% bloom
Field_50Pct_Bloom_Date, Bloom_Date_Diff_Days	ISO date / Days	Your ground note and the difference, when notes are supplied
QA_Flag	Text	OK, or the reason a plot is sent for review

Added when scoped: center-row vs all-row stand, row gap %, canopy height (needs a DSM or point cloud), and your entry IDs.

05 / CROPS AND STATUS

Crop group	Traits	Status
Sunflower	Stand count, open-bloom count, % in bloom, 50% bloom date, canopy height	Production (validated on 879 plots)
Canola, soybean, dry bean, pea	Emergence stand, pod and silique counts, canopy cover	Pilot: model trained on your imagery
Corn, sugarbeet, wheat, potato	Emergence counts, weed escapes, wheat head density	Pilot: model trained on your imagery
Seed lab and custom targets	Germination, ear and cob traits, disease lesions, stomata	Pilot: model trained on your imagery

Our 36 demonstration models (trained on public research datasets) show what we can build. Client models are trained and checked on client data.

06 / WAYS TO START

• **Self-serve:** 21 interactive demos at dakotaai.us/agros/workbench.html, plus this sample ZIP.

• **Archival validation:** send one stitched orthomosaic, your plot map and (optionally) ground notes; we return the full audited CSV + GeoJSON and a comparison to your notes.

• **Guided pilot**, then managed per-plot processing. Every engagement is quoted by email before work starts.