

Perennial wheat report

(Pewhe1 + Pewhe2)

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Jesse's tasks (8Jan2025)

- Marvin data
 - Marvining all pewhe 1 (2022,2023,2024) and pewhe 2 (2023,2024),
 - upload marvin data to pewhe combined
 - upload TKW for pewhe 2 2024 to OPW fieldbook
- Threshing data
 - confirm threshed grain weights, add those to pewhe 2 and pewhe combined
 - * Current theory: 32-1 with hand written tag + 38.5 grams is actually 24-2. This is because hand written envelope is the largest threshed grain weight of entire site-year and Davis guessed it was 32-1, but it's more likely it's from 24-2 because that plot had the highest seedhead weight and one of the highest seedhead counts, yet one of the lowest threshed yields (4.5 grams). The other plots with low harvest efficiency (% of threshed grain recovered from dry seedhead weight) like 12-2 had much lower dry seedhead weights and it's more likely there were just empty seedheads. So if we move handwritten 32-1 to 24-2, we then need to either discard or move the seed in the 24-2 envelope. I think we add it to 24-1. Looking at 24-1 compared with other samples, it looks off. No seed, lots of stem, and that plot also has abnormally low harvest efficiency.
 - * Can we tell differences in how the seeds look between varieties? No. There is way too much variation in both seed size, amount of ergot, amount of hull between plots of the same variety and even within the same plot.
 - * The labeled 32-1 and 32-2 look very similar and the handwritten 32-1 looks very different, so that further supports my hunch of moving that to another plot
 - convert threshed grain weights to kg ha and add to OPW fieldbook

- Weed survey data
 - The 2024 data from 11Jun and 4Jun are in disagreement. Use the yield data to determine which one is correct. It is likely the 4Jun was done incorrectly and 11Jun was done to remedy it, but the 4Jun data just was not tossed out of dataset and now needs to be tossed.
- Generate report for Jake
- PhotoLog

Trial management and specifications

Table 1: Trial timeline

Trial	Site	Planting date	Harvest dates	Termination date
Pewhe 1	St Paul - K8	2021-09-29	18Aug2022, 13-20Jul2023, 19Jul2024	2024-10-11
Pewhe 2	St Paul - Horse Pasture	2022-09-29	12-20Jul2023, 19Jul2024	2024-10-11

Weed control was primarily done by hand, especially in Pewhe 2 where the trial was supposed to be organically managed (though a pre-emergent herbicide application did occur by mistake when plants were dormant in early spring). Spot spraying outside of plot areas in alleys to control perennial weeds did occur.

Pest damage typically occurred in early July on early maturing lines. The annual winter wheat checks matured first. On 12Jul2022 and 6Jul2023 in Pewhe 1 and 2 respectively, winter wheat checks were destroyed by pests. Bird and rabbit fencing were used to deter pests during grain ripening and entries were harvested by hand as soon as they were ready, resulting in multiple harvest dates rather than waiting for all entries to fully mature before harvesting.

Table 2: Crop protection timeline

Trial	2,4-D (0.5-1pt A)	Pendimethalin (2-2.5 pt A)	S-metolachlor (1 pt A)	Bird netting / fencing
Pewhe 1	3Oct2022, 24Apr2024	3May2024, 13Apr2023	24Apr2024	27Jul2022
Pewhe 2		13Apr2023		

Table 3: Fertilizer timeline

Trial	80 kg N A urea	100 kg N composted poultry manure
Pewhe 1	10May2023, 12Apr2024	
Pewhe 2		19Mar2024

Table 4: Trial layout specs. Both trials planted with Hege 1000 at 1-1.5” depth. Each plot consisted of 4 rows at 12” row spacing, with a 2 ft alley between plots in the same range and a 5 ft alley between ranges. Populations were not controlled for, all plots received the same amount of seed by weight.

Trial	Plot length (ft)	Seed per packet (g)
Pewhe 1	15	24
Pewhe 2	20	25

Pewhe 1

Pewhe 1 was an unfunded preliminary trial [led by TLI](#) with 14 entries and 10 variables.

They said they would provide “robust data sheets and collection protocols”, but those never arrived.

In March 2022, standing water over the western edge of the trial caused multiple plots to suffer stand loss. These plots were not dropped from the trial, but the data from them is questionable.

In July 2022, pest damage to plots further degraded confidence in the data quality coming from this trial.

In 2023, many plots lost row definition and the winter wheat checks produced grain yields. This suggests shattering, contamination between plots and contamination within plots of different stand ages.

[Google Site](#) with photos

Table 5: Pewhe 1 trial overview. 14 genotypes. 10 measurements.

Entries	Variables
B1107 (21F3827)	Perenniality
OT38 (21F3801)	Yield, grain
Local bread wheat	Seed size
21F4208	Seed weight
21F3839	Plant height
21F3803	Emergence date
21F3805	Winter hardiness
21F3808	Flowering time
21F3810	Biomass
21F3814	Soil moisture
21F3816	
21F3820	
21F3822	

Table 6: Pewhe 1 yield data. C = complete, IP = in progress, NA = missing or not available

year	wet seed- heads (g)	dry seed- heads (g)	seedhead count	threshed grain (g)	combine yield wet (g)	combine yield dry (g)	straw yield (g)	marvin seed specs
2022	NA	C	C	C	NA	NA	NA	C
2023	C	C	C	C	NA	NA	NA	C
2024	C	C	C	C	C	C	NA	IP

Table 7: Pewhe1 plant performance data

year	lodging	staging	height	weed abundance (% visual)
2022	NA	NA	NA	NA
2023	12Jul2023	6Jun2023, 21Jun2023, 12Jul2023	12Jul2023	NA
2024	19Jul2024	10Jul2024, 19Jul2024	19Jul2024	C

Table 8: Pewhe 1 bonus plant performance data

year	winterkill (y/n)	flowering (y/n)	soil moisture (vwc)	harvest quality (acceptable/n)
2022	C	16Jun2022	16Jul2022	18Aug2022
2023	NA	NA	NA	NA
2024	NA	NA	NA	NA

Harvest notes

27Jul2022 = Finished fencing/netting trial. Jesse took yield from poor yield plots at western end that suffered from standing water, then mowed off due to weeds

18Aug2022 = Harvested all remaining plots. If possible, 3x 24" quadrats taken for yield. Otherwise, seedheads selectively pulled for some data that can be used for marvin and storing. Notes were taken on plots with acceptable populations at harvest

13Jul2023 = Plots past dough stage were harvested at 3x 24" quadrat dimensions. 12 plots were not sufficiently ripe for harvest

19Jul2023 = remaining 12 plots reached sufficient maturity for harvest

Pewhe 2

Pewhe 2 was part of the Organic Perennial Wheat (OPW) add-on trial to the OREI grant.

It was led by Leo, who created [this field book](#) that outlined the collection of the following variables

Entry	Variable
6004	Soil (baseline)
6005	Weed survey at flowering (crop vs weed vs bare ground, dominant species)
6059	Staging
6061	Biomass, total aboveground
Winter wheat	Biomass, weed
	Grain yield
	Yield components (spike count, TGW)
	Plot photos
	Total plot harvest (combine)
	Total forage harvest (forage harvester)

Table 10: Pewhe 2 yield data. C = complete, IP = in progress, NA = missing or not available

year	wet seed- heads (g)	dry seed- heads (g)	seedhead count	threshed grain (g)	combine yield wet (g)	combine yield dry (g)	straw yield (g)	marvin seed specs
2023	C	C	C	C	NA	NA	C	C
2024	C	C	C	C	NA	NA	C	IP

Table 11: Pewhe 2 plant performance data

year	lodging	staging	height	weed abundance (% visual)	weed abundance (g)
2023	12Jul2023	6Jun2023, 21Jun2023, 12Jul2023	12Jul2023	6Jun2023	NA
2024	19Jul2024	26Jun2024, 10Jul2024, 19Jul2024	19Jul2024	4Jun2024, 11Jun2024	19Jul2024

Table 12: Pewhe 2 bonus plant performance data

year	plant counts	emergence scores (%)	canopy scores (weed vs. crop vs. bareground)
2023	C	C	C
2024	NA	NA	C

Pewhe 1 and 2 have emergence data 4 weeks after planting

Harvest notes

12Jul2023 = some plots had high shatterind and/or herbivory

20Jul2023 = some plots were reharvested because they were not sufficiently mature

10Aug2023 = Katherine harvested some lengths of seedheads to give to Prabin/George. The threshed weights were entered into the Master, but this wasn't part of the data collection for this project.

19Jul2024 = Winter wheat plots were dropped in second production year since they were an annual crop that was not replanted. These plots were tilled up in spring, planted to a cover, and managed for weeds. They remain in the data structure for year 2, but the cells are empty

Data processing

Notes

2022 pewhe grain harvest. If okyield=yes, then it was harvested at quadrat dimension specifications. If okyield=no, quadrat dimensions=na. If harvested 27Jul, quadrat dimensions=na. If harvested both 27Jul and 18Aug, harvest date=18Aug. If date/dimensions cannot be inferred from notes, cell is either left empty or na

Some 2022 pewhe harvest data has not been processed yet. Data is missing.

For staging, heights and lodging, I took 1 date from each production year, closest to harvest, for lodging, height and stage. For height and stage, I just reported the average whereas raw data n=5 or n=10.

For pewhe 2, production year 1. If a given plot was harvested twice (i.e. 12Jul and again on 20Jul), the later harvest date and data were used.

converting quadrat dimensions to square meter basis

For threshing weights, we have 2 measurements for 32-1 and their sum is too large, but there is no missing data. There is one plot where there was no seed after threshing, but this plot also had no seedheads so it's unlikely the weight from the handwritten corresponds to it.

We have the 2024 pewhe 2 threshed grain weights in Master combined, but we are holding off on converting to kg ha and uploading to OPW field book until we can confirm what has occurred with this extra sample.