# EcoTea™ Research Data Summary (2019-2022)
# Applied Nutrient Use Efficiency

EcoTea™ has conducted 4 years of 3rd party replicated plot trials and a variety of on-farm field scale trials to determine the effects of broad-spectrum biology on crop nutrient efficiency, yields and quality. Granular fertilizer was used for all plots trials, and both granular and liquid fertilizers were used in the field/farm sites. A summary of trial sites is at the end of this document.

Standard rates of EcoTea™ Liquid and Dry Seed Dressings, EcoTea™ MycoPak, In-Furrow HDI and Residue Digester products were compared against conventional grower's standard for each site. Conventional treated seed or bare seed were used depending on seed availability or most common conventional practice for that crop.

The following is a summary of the observations and deductions for each crop type. Specific trial results and protocols are available through EcoTea™ dealers upon request. Supplemental on farm trial results are available as well upon request.

## OATS

Three separate replicated trial sets with oats were conducted at both the Swan River and Winnipeg sites in 2021 and 2022, for a total of over 80 comparative plots. EcoTea™ Seed Dressings were used while reducing both applied N and P in varying amounts. Across all our trials oats has shown the most consistent positive yield response with EcoTea™, relative to other crops we have been trialing.

- When N was reduced by 20% and P reduced by 10%. Even with the reduced fertility EcoTea™ treated oats saw an average yield increase of 7.05% in comparison to the conventional grower's standard (full fertility).
- When N+P were reduced by 47% and 30% respectively (Swan River Site Only), EcoTea™ treated oats saw an average yield reduction of 6.2%. Despite the significant reduction, the savings in fertility resulted in calculated net earnings increase of $30.00/acre at spring 2022 fertilizer and fall 2022 crop value prices. ***NOTE: The significant reduction of fertility is for research purposes and is not recommended as a commercial practice.***

**Conclusions:** EcoTea™ treated oats saw a statistically significant yield increase over conventional grower's standard even whilst reducing N+P by 20% and 10% respectively, significantly increasing net/acre profits. EcoTea™ treated oats saw a slight yield reduction when N+P were reduced by 47% and 30% respectively, however net acre profits still increase at current fertilizer and crop prices. 3rd party farm trials in 2019, as well as 1000's of seeded acres the past 3 years have reinforced these findings.

## Spring Wheat

Three replicated trial sets with wheat over three years were conducted at both the Winnipeg, MB (3 yrs). All EcoTea™ seed dressings were trialed reducing both N+P in varying amounts. All three trials saw no statistically significant yield differences when compared with the conventional grower's standard.

- When N was reduced by 20% and P by 10%, there was a yield variance of less than 1.66% of EcoTea™ treated plots compared to the grower's standard 100% rate fertility. This average was represented by 39 field plots over 3 trials, in 3 different crop years (2020, 2021 (Drought), 2022).
- Two 3rd party farm scale trials were conducted with full fertility in Southern MB (Arnaud and Oakville, MB) showing an average of a 3bu/acre increase over grower's standard. These results have not been replicated in small plot trials to date.

**Conclusion:** With various ranges of reduced fertility EcoTea™ treated wheat yielded within a 2% statistical variance compared to the conventional grower's standard at full fertility. When full rates of fertility were used with EcoTea™ there has been no statistical difference in yield when compared to the conventional grower's standard full rate fertility. Net profits per acre are consistently higher when EcoTea™ is used while reducing spring fertility between 10-20%. Clearly net profits increase as fertility prices increase relative to the commodity prices. When prices are >$1.10/lb of applied N and >$1.70/lb of applied P, EcoTea™ treated wheat can increase per acre profits significantly over the conventional grower's standard.

****Discovery Farm Wheat Plots Note.** In crop year 2022 EcoTea™ undertook a field scale comparative plot trial at a 10-acre site managed by Discovery Farm, Langham, SK. A separate report on this project will be published later this January. The first year of this project trialed EcoTea™ seed dressings, in-furrow, and residue digester in conjunction with 5 different conventional programs using various rates and types of fertility, and standard herbicide program. These 5 plots were compared against a conventional grower's standard with full rate fertility. Six plots of 1.5 acres each were seeded in late May into extremely dry soil conditions, a timely rain in early June ensured a crop came up, but for the remainder of the year the site only saw a total of 2.5 inches of rain, essentially drought conditions.

Although, we don't want to draw too firm of conclusions from this first year on a site that had a lot of compaction and saline conditions, the top yielding plot (2 bushels higher than grower's standard) was where EcoTea™ residue digestor and liquid seed dressing were applied with 50% less applied Nitrogen and 20% less Phosphorus (Alpine) than the full rate applied MAP grower's standard. The main reason for this result was the drought conditions, in that the biology enabled the wheat to access moisture longer, kept maturing 2 weeks longer than the plot that had no EcoTea™, resulting in a higher yield. Average yield for the entire site was 20bu/acre, so drought was a huge issue. It is our intent to seed peas at the site in 2023.

**Other Crops.** EcoTea™ products have full functional microbial diversity and have shown commercially positive affects on all crops and plants. We have dedicated multi-year customers using a variety of our products on Potatoes, Cereals, Oils Seeds, Legumes, Cranberries and Vineyards, based on their own trials. As we, grow our capabilities we hope to direct research efforts into these areas as well.

All plot trials were conducted through 3rd party research facilities:

- Sir William Stephenson Research Center; Winnipeg, MB. (Peas, Wheat, Oats, Corn, Soybeans) 2020-2022
- New Era Ag Research; Swan River, MB: 2021-2022 (Peas, Oats, Canola)
- Peace Country Forage and Grain Association; Fairview, AB: 2019-2022 (Wheat and Canola).

Multi-Year field scale trials and farm evaluations have been conducted at sites in: Cardale, MB; Tilley, AB; Radville, SK; Reinland, MB; Elie, MB; Southern Ontario (multiple sites).

A ten-acre EcoTea™ soil health research site was initiated in 2022 at Discovery Farm at Langham, SK.

# EcoTea Potato Preliminary Data

**Client:** Ken Sabatier
Director of Operations
EcoTea/Overton Environmental
Email: ken@overtonee.ca
Cell: 431-337-3567

**Principal Investigators:** Darin Gibson and Debbie Jones, Gaia Consulting Ltd.

**Objective:** To evaluate the effect of EcoTea™ HDI on potato yield and quality in potatoes grown for fresh market production in Manitoba.

**Procedure:**

Plot size: 4 rows by 10 m (Assessments conducted on 2 centre rows)
Trial design: RCB 4 replicates
Plot location: [redacted] field near Morden, MB
Crop: Potatoes
Variety: Sangre
Row spacing: 38”
In-row spacing: 10”
Treatments: Table 1.

Table 1. List of treatments.

| | Treatment | % Recommended Fertilizer | IF Fung |
|---|---|---|---|
| 1 | Grower Standard[1] 100% Fertility | 100 | Yes |
| 2 | GS + EcoTea In-Furrow (4 Gal/Acre Rate) | 100 | Yes |
| 3 | GS + EcoTea In-Furrow (10 Gal/Acre Rate) | 100 | Yes |
| 4 | GS + [redacted] (352 mL/ac) | 100 | Yes |
| 5 | GS + [redacted] (352 mL/ac) + EcoTea In-Furrow (4 Gal/Acre Rate) | 100 | Yes |
| 6 | 80% GS Fertility | 80 | Yes |
| 7 | 80% Fert + EcoTea IF (4 Gal/Acre Rate) | 80 | Yes |
| 8 | 80% Fert + EcoTea IF (10 Gal/Acre Rate) | 80 | Yes |
| 9 | 80% GS Fertility No Fung | 80 | No |
| 10 | 80% Fert + EcoTea (10 Gal/Acre Rate) No Fung | 80 | No |
| 11 | 80% Fert + EcoTea (10 Gal + Amino Acids) No Fung | 80 | No |
| 12 | 60% GS Fertility No Fung | 60 | No |
| 13 | 60% Fert + EcoTea IF (10 Gal/Acre Rate) No Fung | 60 | No |
| 14 | 60% Fert + EcoTea IF (10 Gal/Acre + Amino Acids) No Fung | 60 | No |

[1]GS - Grower Standard Fertility – Treatments 1-5, Match the fertility of [redacted] (starter, NPKS rates and timings), in-furrow [redacted] fungicide.
EcoTea rates as listed. Amino Acid rate 5 lb/ac

**Results**:

Table 1. Emergence data.

| | In-Furrow | | | | | Plants | Stems | Stems |
|---|---|---|---|---|---|---|---|---|
| Trt | [redacted] | EcoTea | [redacted] | A.Acids | Fertility | (20 row-m) | (20 row-m) | (Plant) |
| 1 | ✓ | | | | 100% | 64.3 a | 141.8 a | 2.21 a |
| 2 | ✓ | 4 gal/ac | | | 100% | 64.8 a | 152.8 a | 2.36 a |
| 3 | ✓ | 10 gal/ac | | | 100% | 63.8 a | 153.0 a | 2.39 a |
| 4 | ✓ | | ✓ | | 100% | 62.5 a | 144.5 a | 2.32 a |
| 5 | ✓ | 4 gal/ac | ✓ | | 100% | 63.5 a | 142.3 a | 2.25 a |
| 6 | ✓ | | | | 80% | 61.3 a | 131.8 a | 2.17 a |
| 7 | ✓ | 4 gal/ac | | | 80% | 66.3 a | 154.3 a | 2.33 a |
| 8 | ✓ | 10 gal/ac | | | 80% | 64.3 a | 139.8 a | 2.18 a |
| 9 | - | | | | 80% | 63.5 a | 142.8 a | 2.25 a |
| 10 | - | 10 gal/ac | | | 80% | 65.3 a | 151.3 a | 2.32 a |
| 11 | - | 10 gal/ac | | ✓ | 80% | 63.0 a | 148.5 a | 2.37 a |
| 12 | - | | | | 60% | 64.0 a | 149.5 a | 2.34 a |
| 13 | - | 10 gal/ac | | | 60% | 62.5 a | 159.0 a | 2.55 a |
| 14 | - | 10 gal/ac | | ✓ | 60% | 63.8 a | 149.8 a | 2.36 a |
| LSD P=.05 | | | | | | ns | ns | ns |
| CV | | | | | | 5.5 | 8.6 | 8.5 |
| Treatment Prob(F) | | | | | | 0.9021 | 0.2685 | 0.4373 |

Table 2. Stem and stolon canker data.

| | In-Furrow | | | | | Stem Canker Severity | Stem Canker Incidence | Stolon Canker Severity | Stolon Canker Incidence |
|---|---|---|---|---|---|---|---|---|---|
| Trt | [redacted] | EcoTea | [redacted] | A.Acids | Fertility | (0-100 Index) | (%) | (0-100 Index) | (%) |
| 1 | ✓ | | | | 100% | 1.7 bcd | 6.8 b-f | 2.4 a | 7.6 a |
| 2 | ✓ | 4 gal/ac | | | 100% | 0.7 d | 2.2 ef | 0.0 a | 0.0 a |
| 3 | ✓ | 10 gal/ac | | | 100% | 1.2 cd | 4.6 c-f | 1.3 a | 3.2 a |
| 4 | ✓ | | ✓ | | 100% | 0.8 cd | 2.9 def | 0.5 a | 1.1 a |
| 5 | ✓ | 4 gal/ac | ✓ | | 100% | 0.6 d | 2.0 f | 0.8 a | 1.4 a |
| 6 | ✓ | | | | 80% | 1.9 bcd | 7.5 b-e | 2.4 a | 7.6 a |
| 7 | ✓ | 4 gal/ac | | | 80% | 0.9 cd | 3.1 def | 0.5 a | 1.1 a |
| 8 | ✓ | 10 gal/ac | | | 80% | 1.9 bcd | 7.7 bcd | 0.0 a | 0.0 a |
| 9 | - | | | | 80% | 2.3 abc | 9.3 abc | 1.3 a | 3.2 a |
| 10 | - | 10 gal/ac | | | 80% | 3.3 ab | 13.3 ab | 2.4 a | 4.0 a |
| 11 | - | 10 gal/ac | | ✓ | 80% | 1.9 bcd | 7.6 b-e | 1.6 a | 4.0 a |
| 12 | - | | | | 60% | 4.1 a | 16.3 a | 2.9 a | 5.5 a |
| 13 | - | 10 gal/ac | | | 60% | 3.0 ab | 10.8 abc | 0.0 a | 0.0 a |
| 14 | - | 10 gal/ac | | ✓ | 60% | 3.2 ab | 12.8 ab | 0.5 a | 1.1 a |
| LSD P=.05 | | | | | | t | t | ns | ns |
| CV | | | | | | 24.98t | 30.85t | 136.0t | 133.28t |
| Treatment Prob(F) | | | | | | 0.0017 | 0.0009 | 0.3607 | 0.3787 |

t: data transformed to stabilize variance, LSD not reported.

Table 3. Tuber yield.

| | In-Furrow | | | | | Yield (cwt/ac) | | | | | | 2.25-3.0 oz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trt | [redacted] | EcoTea | [redacted] | A.Acids | Fertility | <2" | 2-2.25" | 2.25-3.0" | 3-3.5" | >3.5" | Total | (%) |
| 1 | ✓ | | | | 100% | 18.0 a | 27.3 a | 171.2 d | 46.6 a | 4.4 a | 267.4 d | 63.815 a |
| 2 | ✓ | 4 gal/ac | | | 100% | 19.7 a | 31.5 a | 180.8 cd | 43.9 a | 0.9 a | 276.8 cd | 64.78 a |
| 3 | ✓ | 10 gal/ac | | | 100% | 19.4 a | 30.9 a | 186.8 cd | 33.8 a | 11.1 a | 281.9 cd | 66.248 a |
| 4 | ✓ | | ✓ | | 100% | 23.5 a | 22.6 a | 186.9 cd | 56.7 a | 5.8 a | 295.5 a-d | 63.32 a |
| 5 | ✓ | 4 gal/ac | ✓ | | 100% | 15.3 a | 24.8 a | 187.9 bcd | 54.0 a | 6.2 a | 288.2 bcd | 65.565 a |
| 6 | ✓ | | | | 80% | 15.4 a | 22.8 a | 174.6 d | 56.5 a | 4.5 a | 273.8 cd | 63.895 a |
| 7 | ✓ | 4 gal/ac | | | 80% | 20.9 a | 33.8 a | 183.4 cd | 44.4 a | 5.4 a | 287.9 bcd | 63.705 a |
| 8 | ✓ | 10 gal/ac | | | 80% | 17.1 a | 28.7 a | 189.8 bcd | 37.6 a | 3.4 a | 276.5 cd | 68.845 a |
| 9 | - | | | | 80% | 19.1 a | 24.4 a | 217.2 ab | 43.1 a | 1.4 a | 305.1 abc | 71.123 a |
| 10 | - | 10 gal/ac | | | 80% | 16.8 a | 29.4 a | 206.7 abc | 49.1 a | 2.9 a | 304.9 abc | 67.843 a |
| 11 | - | 10 gal/ac | | ✓ | 80% | 19.5 a | 23.6 a | 190.2 bcd | 58.4 a | 4.3 a | 295.8 a-d | 64.34 a |
| 12 | - | | | | 60% | 13.8 a | 23.7 a | 205.6 abc | 60.6 a | 5.5 a | 309.3 abc | 66.553 a |
| 13 | - | 10 gal/ac | | | 60% | 20.8 a | 27.0 a | 205.9 abc | 66.7 a | 6.9 a | 327.3 a | 63.083 a |
| 14 | - | 10 gal/ac | | ✓ | 60% | 17.5 a | 32.3 a | 226.2 a | 41.9 a | 0.0 a | 317.9 ab | 71.12 a |
| LSD P=.05 | | | | | | ns | ns | 27.2 | ns | ns | 33.5 | ns |
| CV | | | | | | 24.2 | 21.7 | 9.7 | 27.8 | 114.9 | 7.9 | 7.25 |
| Treatment Prob(F) | | | | | | 0.3139 | 0.1721 | 0.0130 | 0.0692 | 0.2986 | 0.0347 | 0.3115 |

Table 4. Tuber Specific gravity, number and average weight.

| | In-Furrow | | | | | | Tuber Number | Avg Tuber wt |
|---|---|---|---|---|---|---|---|---|
| Trt | [redacted] | EcoTea | [redacted] | A.Acids | Fertility | Specific Gravity | (Plant) | (oz) |
| 1 | ✓ | | | | 100% | 1.0636 cd | 5.96 a | 5.10 b-e |
| 2 | ✓ | 4 gal/ac | | | 100% | 1.0624 d | 6.56 a | 4.78 e |
| 3 | ✓ | 10 gal/ac | | | 100% | 1.0641 cd | 6.54 a | 5.02 cde |
| 4 | ✓ | | ✓ | | 100% | 1.0619 d | 7.02 a | 5.03 b-e |
| 5 | ✓ | 4 gal/ac | ✓ | | 100% | 1.0619 d | 6.31 a | 5.35 abc |
| 6 | ✓ | | | | 80% | 1.0633 cd | 6.24 a | 5.49 ab |
| 7 | ✓ | 4 gal/ac | | | 80% | 1.0638 cd | 6.54 a | 4.89 de |
| 8 | ✓ | 10 gal/ac | | | 80% | 1.0643 bcd | 6.13 a | 5.20 a-d |
| 9 | - | | | | 80% | 1.0627 d | 6.91 a | 5.13 b-e |
| 10 | - | 10 gal/ac | | | 80% | 1.0640 cd | 6.69 a | 5.16 b-e |
| 11 | - | 10 gal/ac | | ✓ | 80% | 1.0627 d | 6.47 a | 5.37 abc |
| 12 | - | | | | 60% | 1.0656 abc | 6.42 a | 5.58 a |
| 13 | - | 10 gal/ac | | | 60% | 1.0678 a | 7.25 a | 5.38 abc |
| 14 | - | 10 gal/ac | | ✓ | 60% | 1.0668 ab | 7.24 a | 5.11 b-e |
| LSD P=.05 | | | | | | 0.0025 | ns | 0.42 |
| CV | | | | | | 0.17 | 9.44 | 5.65 |
| Treatment Pr | | | | | | 0.0009 | 0.1838 | 0.0308 |

## ECO TEA Agronomics and Yield on Norkota Russet Potatoes Lethbridge, AB Hamman AG Research 2023

**Objective-** Compare Eco Tea Biostimulant for yield and Quality with reduced fertilizer rate and observations on incidence of disease including various potato diseases

### Materials and Methods.

Whole seed piece Norkota Russet 3 Seed Pieces per m row -Planted May 20 -Center pivot irrigated with approx 14 inches water.
Weed control with early Premergent application of Low label rate Flumioxazin over entire trial. And incrop with metribuzin and Clethodim.
Fertilizer blend drilled in before planting with band application at rates as indicated in treatment list
Eco Tea was formulated with 1 liter A jug mixed with 22 l Eco Tea B pail

10 gpa Concentrate diluted 1:2 with non chlorine water and applied at planting in- furrow application
4 gpa Concentrate diluted 1:5 with non chlorine water and applied at planting in-furrow application

### SUMMARY DATA - all 4 rep data is on pdf of stats summary attached to this report.

| | | Fert Rate N-P-K-S | | Vigor | | Total yield | Mean Size Distribution -1 row sample | | | | Severity Rhizoctonia (1=no disease, 10 =100% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trt # | Seed Trt | Standard Fertilizer 150-100-80-50 | In Furrow Eco Tea Potato | Vigor 7 DAE & observe Sdl disease | Vigor 28 DAE & observe Foliar disease | Yield for 12 m plot total kg | Yield potatoes > 200 g | Yield potatoes 100 g-200 g | Yield potatoes 50 g-100 g | Spec Gravity | Ave Rating Rhizoc. 10 large.tubers 1-10 |
| 1 | [redacted] | 100 % Farmer Stn | *0 gpa* | *5.5* | *6.5* | *34.1 a* | 6443 a | *6179 a* | *1843 a* | *1.095* | *2.2* |
| | | | | | No disease noted | % of sample | *44%* | *42%* | *13%* | | |
| 2 | [redacted] | 100 % Farmer Stn | *4 gpa* | *5.75* | *6.5* | *30.1 a* | 5227 a | *6254 a* | *2470 a* | *1.088* | *1.9* |
| | | | | | No disease noted | % of sample | *37%* | *45%* | *18%* | | |
| 3 | [redacted] | 80 % Farmer Stn | *4 gpa* | *5.5* | *7* | *35.5 a* | *6393 a* | *6835 a* | *3219 a* | *1.087* | *1.2* |
| | | | | | No disease noted | % of sample | *39%* | *42%* | *20%* | | |
| 4 | [redacted] | 80 % Farmer Stn | *10 gpa* | 6.5 | 7.5 | *38.5 a* | *7939 a* | *5302 a* | *2391 a* | *1.086* | *1.1* |
| | | | | | No disease noted | % of sample | *51%* | *34%* | *15%* | | |
| 5 | Bare Seed | 80 % Farmer Stn | *10 gpa* | *6* | *7.5* | *36.0 a* | *4449 a* | *5763 a* | *2480 a* | *1.097* | *2.2* |
| | | | | | No disease noted | % of sample | *35%* | *45%* | *20%* | | |
| 6 | Bare Seed | 60 % Farmer Stn | *10 gpa* | *6* | *6.5* | *34.3 a* | *7815 a* | *6079 a* | *2334 a* | *1.102* | *2.1* |
| | | | | | No disease noted | % of sample | *48%* | *37%* | *14%* | | |
| | | | | NSD | NSD | NSD | NSD | NSD | NSD | NSD | NSD |

**Means followed by the same letter are Not significantly different at P = .1 LSD analysis ( pdf ARM stats analysis attached**

## CONCLUSIONS:

**There was NSD in total yield of 2 center rows from each plot among treatments**

**Treatment 4 ([redacted]treated seed + 10 gpa Ecotea & 80 % farmer fertilzer rate tended to yield highest followed by:**

**Treatment 5 (untreated seed + 10 gpa Ecotea & 80% farmer fertilizer rate**

**Treatment 3 was 3rd highest yield followed by Trt 1 & 6 (trt 2 appeared as an anomoly as yields were quite low in rep 3 & 4 due to some weed control issues.**

**There was NSD in size distribution of potatoes among treatments although Treatment 4 & 6 Tended to have about 50% of potatoes over 200 g.**

**Other treatments were not much different in % of potatoes over 200 g as they were all in about 35% (trt 5 ) up to 44% (trt 1)**

**Eco tea treatments tended to have excellent yield equal to 100% fertilizer with High % of large potatoes (ie no indication of bio stimulation of extra tubers.)**

**DAE is Days after emergence! Slightly Better emergence and vigor in reps 1 and 2 compared to rep 3 & 4**

**No Disease was observed in early observations- Only low levels of black scurf (rhizoctonia) at harvest.**

**Rhizoctonia (Black scurf) assessed on 10 mature potatoes**

**contact : Dr. Bill Hamman 403 308 4099 email whamman@shaw.ca**