

1888H Kauran luomulannoituskoe

Ruutukoe perustettiin pellolle 11.5.2018, tarkoituksena oli tutkia Ecolan-lannoitteen sekä luomuun soveltuvien hiven- ja bakteerivalmisteiden vaikutuksia kauralla. Kokeen lajikkeena käytettiin 'Avantia'. Koe ei saanut lannoituksen lisäksi muita toimenpiteitä. Koejäseninä oli 6 eri lannoituskäsittelyä sekä kontrolli, joka ei saanut lannoitetta lainkaan.

Koe orastui tasaisesti ja yhtä aikaa, kaikilla ruuduilla kevättiheys oli 100 %. Kaura ei kuivasta ja kuumasta kesästä huolimatta kärsinyt erityisesti stressistä, mutta jonkin verran näkyi kirvojen aiheuttamaa viroosia. Myöskään ravinnepuutosoireita, kuten mangaanipuutosta, ei havaittu kasvukauden aikana. Lannoittamaton kontrolli tuli tähkälle muutamaa päivää lannoitettuja jäseniä myöhemmin (tilastollisesti merkitsevä ero), mutta tuleentui pari päivää muita aikaisemmin. Tuleentumiserot eivät olleet merkitseviä.

Kaikki lannoituskäsittelyt nostivat satoa lannoittamattomaan kontrolliin verrattuna, mutta eri lannoitustasojen välillä ei ollut eroja. Sadonlaatuun vaikutukset olivat pieniä. Isoin lannoiteannos 80kg N antoi pienimmän tuhannen jyvän painon, mikä oli merkitsevä ero verrattuna kahteen lannoitekäsittelyyn (40 kg N ja 40 kg N + Nutrilife 1 l/ha), mutta ei verrattuna lannoittamattomaan kontrolliin. Valkuaispitoisuus laski hieman kaikilla lannoitetuilla jäsenillä.

Agricultural Foundation of Trade

Trial ID: 1888H_kaura_Ecolan_agra	Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri
Protocol ID: 1888H	Location: Hämeenlinna, Hauho Trial Year: 2018
Project ID:	Investigator: Milla Valisalo
	Study Director: Juho Urkko
	Sponsor Contact:

Trt No.	Type	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Other Rate	Other Rate Unit	Growth Stage	Appl Code
1	STD	0 kg N/ha									
2	FERT	Ecolan Agra -N -P -K	80 45,71429 22,85714 11,42857	GA/kg	GR	40 22,8571 11,4286 5,71429	kg ai/ha	500	kg/ha	0	A
3	FERT	Ecolan Agra -N -P -K PLHE Ecolan Agra BactoBoost	80 45,71429 22,85714 11,42857	GA/kg	GR	40 22,8571 11,4286 5,71429	kg ai/ha	500	kg/ha	0	A
4	FERT	Ecolan Agra -N -P -K PLHE ZM Grow	80 45,71429 22,85714 11,42857	GA/kg	GR	40 22,8571 11,4286 5,71429 1	kg ai/ha l/ha	500	kg/ha	0	A B
5	FERT	Ecolan Agra -N -P -K	80 45,71429 22,85714 11,42857	GA/kg	GR	80 45,7143 22,8571 11,4286	kg ai/ha	1000	kg/ha	0	A
6	FERT	Ecolan Agra -N -P -K PLHE Nutralife	80 45,71429 22,85714 11,42857	GA/kg	GR	40 22,8571 11,4286 5,71429 1	kg ai/ha l/ha	500	kg/ha	0	A B
7	FERT	Ecolan Agra -N -P -K PLHE Fosfix	80 45,71429 22,85714 11,42857	GA/kg	GR	40 22,8571 11,4286 5,71429 1	kg ai/ha l/ha	500	kg/ha	0	A B

Replications: 3, Untreated treatments: 1, Design: Randomized Complete Block (RCB), Treatment units: Treated 'Plot' experimental unit size, Dry Form. Unit: %, Treated 'Plot' experimental unit size Width: 1,25 meters, Treated 'Plot' experimental unit size Length: 8 meters, Application volume: 200 L/ha, Mix size: 0.9 L, Overage: 50%, Format definitions: G-All7.def, G-All7.frm

Product quantities required for listed treatments and applications of trials included in this table:

Amount*	Unit	Treatment Name	Form Conc	Form Unit	Form Type	Lot Code
10 500,001	g	Ecolan Agra	80	GA/kg	GR	

* 'Per area' calculations based on 3 replicates of 1,25 by 8 meters 'Plot' experimental units (area of one treatment).

General Trial Information	
Study Director: Juho Urkko	Investigator: Anni Kymalainen Title: Reseacher
Discipline: O other	Trial Status: E established
Initiation Date: Apr-26-2018	
Trial Location	
City: Hauho	Country: FIN Finland
State/Prov.: Hämeenlinna	Climate Zone: EPPONE EPPO North East
Postal Code: 14700	
Latitude of LL Corner °: 61,14 N	
Longitude of LL Corner °: 24,59 E	
Conducted Under GLP: No	
Conducted Under GEP: No	
Keywords: kaura, luomu, N-lannoitus, Ecolan Agra, Lantmännen BioAgri	

Objectives:
Kokeen tarkoituksena on tarkastella Ecolan Agra-lannoitteen (N-P-K 8-4-2) sekä Lantmännen BioAgri -lannoitteen vaikutusta kauralla. Lannoitteen lisäksi selvitetään myös typpibakteerin lisäämisen vaikutuksia lannoitusvaikutuksen tehostajana. Koe toteutetaan peltokokeena, jossa loholla on käytetty tavanomaisia viljelytoimia, mutta koe toteutetaan ilman kemiallisia torjunta-aineita "luomu-kokeena". Kokeessa seurataan kasvuston kasvua ja kehitystä, sadon määrä ja sadon laatu mitataan.

The aim of the trial is to assess the impact of fertilizer Ecolan-Agra (N-P-K 8-4-2) on spring oat. Bacterium product with enhancing effect to nitrogen utilization of plants is also evaluated. Trial will be conducted as field trial with late oat variety 'Avanti'. Trial will be carried out following principles of organic farming practices and no chemical pesticides will be used. Growth and development of plants will be assessed and yield and yield quality will be measured.

Agricultural Foundation of Trade

Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri
 Trial ID: 1888H_kaura_Ecolan_agra Location: Hämeenlinna, Hauho Trial Year: 2018
 Protocol ID: 1888H Investigator: Milla Valisalo
 Project ID: Study Director: Juho Urkko
 Sponsor Contact:

Contacts

Study Director: Juho Urkko

Investigator: Anni Kymalainen **Title:** Reseacher
Organization: Lantmännen Agro Experimental Farm
Address: Hahkialantie 57
City+State/Prov: Hauho **Mobile No.:** +358406672009
Postal Code: 14700 **E-mail:** anni.kymalainen@lantmannen.com
Country: FIN Finland

Crop Description

Crop 1: AVESA Avena sativa Common oat
Variety: Avanti **BBCH Scale:** BCER
Seed Size, Unit: 47,3 TSWG
Planting Date: May-11-2018
Planting Method: DRILLE drilled
Planting Equipment: PD plot drilling machine
Emergence Date: May-21-2018
Harvest Date: Aug-17-2018
Harvested Width, Unit: 1,25 m
Harvested Length, Unit: 8 m
Harvest Equipment: Wintersteiger Nurserymaster EI
% Standard Moisture: 14,0
Planting Rate, Unit: 338 kg/ha
Depth, Unit: 5 cm
Row Spacing, Unit: 12,5 cm
Planting Density, Unit: 500 seed/m2
Soil Moisture: DRY dry
Seed Bed: MEDIUM medium

Site and Design

Treated Plot Width: 1,25 m **Site Type:** FIELD field
Treated Plot Length: 8 m **Experimental Unit:** 1 PLOT plot
Treated Plot Area: 10 m2 **Treatments:** 7 **Tillage Type:** CONTIL conventional-till
Replications: 3 **Study Design:** RAOBL Randomized Complete Block (RCB)

No.	Previous Crop	Previous Pesticides	Year
1.	Spring turnip rape	Butisan S, Kestac, Eflor	2017
2.	Pesticide trials	various	2016
3.	Spring barley	Tooler, Tomahawk, Prosaro, Comet Pro, RoundUp Max	2015

Comment: Kokeelle ei suoriteta muita toimenpiteitä lannoituksen lisäksi.

Soil Description

Description Name: Väkkärä
Texture: L loam
pH: 6,6 **Soil Name:** Loamy
Analyzed By:
 Organic matter 6,0 - 11,9 %
 Soil electrical conductivity: 1,2
 Manganese value pH corrected, value (17) tolerable.
 Analyzed by Eurofins Viljavuuspalvelu Oy, 29.10.2014.

Additional Measured Elements

Element	Quantity	Unit
Ca	2200	MG/L
P	41	MG/L
K	150	MG/L
Mg	180	MG/L
S	7,4	MG/L
Cu	3,9	MG/L
Zn	2,3	MG/L

Agricultural Foundation of Trade

Trial ID: 1888H_kaura_Ecolan_agra	Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri
Protocol ID: 1888H	Location: Hämeenlinna, Hauho Trial Year: 2018
Project ID:	Investigator: Milla Valisalo
	Study Director: Juho Urkko
	Sponsor Contact:

Application Description

	B
Application Date:	May-23-2018
Appl. Start Time:	6:40
Appl. Stop Time:	6:49
Application Method:	SPRAY
Application Placement:	PLOT
Applied By:	HT,TK
Air Temperature, Unit:	15,2 C
% Relative Humidity:	69
Wind Velocity, Unit:	0,4 MPS
Wind Direction:	N
Dew Presence (Y/N):	N no
% Cloud Cover:	50
Next Moisture Occurred On:	Jun-7-2018
Time to Next Moisture, Unit:	15 DAY
Moisture 1 Week after Appl.:	0 mm

Crop Stage At Each Application

	A	B
Crop 1 Code, BBCH Scale:	AVESA BCER	AVESA BCER
Stage Scale Used:		BBCH
Stage Majority, Percent:		10

	AVESA	AVESA	AVESA	AVESA	AVESA	AVESA	AVESA		
Crop Code	Common oat	Common oat	Common oat	Common oat	Common oat	Common oat	Common oat		
Crop Name	PLOT -	PLANT -	PLOT -	PLOT -	PLANT -	PLANT -	GRAIN -		
Part Rated	May-28-2018	Jul-19-2018	Jul-19-2018	Aug-2-2018			Aug-17-2018		
Rating Date	DENSIT	HEIGHT	LODGIN1	LODGIN2	EAREME	SENESC	YIELD		
Rating Type	%	cm	%	%	DAP	DAP	kg/ha		
Rating Unit	20	70	70						
Crop Stage Majority	- 5	- 57	- 57	- 71			- 86		
Days After First/Last Applic.	7 DE-1	59 DE-1	59 DE-1	73 DE-1			88 DE-1		
Days After Emergence	P	APC	P	P	TL[5]	TL[7]	TL[9] APoC		
ARM Action Codes	0	0	0	0	0	0	0		
Number of Decimals									
Trt Treatment	Rate	Appl							
No. Name	Rate Unit	Code	1*	2*	3*	4*	6*	8*	10*
1 0 kg N/ha			100 -	58 c (0,0%)	0 -	0 -	48 a	82 -	4292 b (100,0%)
2 Ecolan Agra	40 kg ai/ha A		100 -	64 b (-11,0%)	0 -	0 -	45 b	84 -	5476 a (127,6%)
3 Ecolan Agra Ecolan Agra BactoBoost	40 kg ai/ha A A		100 -	65 ab (-12,7%)	0 -	0 -	46 b	84 -	5424 a (126,4%)
4 Ecolan Agra ZM Grow	40 kg ai/ha A 1 l/ha B		100 -	66 ab (-13,9%)	0 -	0 -	46 b	84 -	5453 a (127,1%)
5 Ecolan Agra	80 kg ai/ha A		100 -	70 a (-20,8%)	0 -	0 -	45 b	84 -	5984 a (139,4%)
6 Ecolan Agra Nutrilife	40 kg ai/ha A 1 l/ha B		100 -	63 b (-9,2%)	0 -	0 -	46 b	84 -	5331 a (124,2%)

Agricultural Foundation of Trade

Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri Location: Hämeenlinna, Hauho Trial Year: 2018 Investigator: Milla Valisalo Study Director: Juho Urkko Sponsor Contact:											
Trial ID: 1888H_kaura_Ecolan_agra Protocol ID: 1888H Project ID:			AVESA Common oat PLOT - May-28-2018 DENSIT % 20 - 5 7 DE-1 P 0			AVESA Common oat PLANT - Jul-19-2018 HEIGHT cm 70 - 57 59 DE-1 APC 0			AVESA Common oat PLOT - Jul-19-2018 LODGIN1 % 70 - 57 59 DE-1 P 0		
AVESA Common oat PLOT - Aug-2-2018 LODGIN2 % 71 73 DE-1 P 0			AVESA Common oat PLANT - EAREME DAP TL[5] 0			AVESA Common oat PLANT - SENESC DAP TL[7] 0			AVESA Common oat GRAIN - Aug-17-2018 YIELD kg/ha - 86 88 DE-1 TL[9] APoC 0		
Trt No.	Treatment Name	Rate	Appl Unit	Code	1*	2*	3*	4*	6*	8*	10*
7	Ecolan Agra Fosfix	40 kg ai/ha 1 l/ha	A B		100 -	65 ab (-13,3%)	0 -	0 -	45 b	84 -	5413 a (126,1%)
LSD	P=.05				.	3,8	.	.	0,8 - 0,8	.	341,0 - 440,4
Standard Deviation					0,0	2,1	0,0	0,0	0,0t	0,0t	0,0t
CV					0,0	3,28	0,0	0,0	0,25t	0,0t	0,5t
Levene's F					0,00	0,339	0,00	0,00	0,167	0,00	0,298
Levene's Prob(F)					.	0,905	.	.	0,982	.	0,928
Skewness					.	-0,3572	.	.	1,2775*	-2,2017*	-1,4835*
Kurtosis					.	1,6331	.	.	1,1377	3,1384*	2,4932*
Replicate F					0,000	0,139	0,000	0,000	3,712	0,000	1,590
Replicate Prob(F)					1,0000	0,8716	1,0000	1,0000	0,0556	1,0000	0,2441
Treatment F					0,000	8,759	0,000	0,000	10,879	0,000	16,794
Treatment Prob(F)					1,0000	0,0008	1,0000	1,0000	0,0003	1,0000	0,0001

Agricultural Foundation of Trade

Trial ID: 1888H_kaura_Ecolan_agra Protocol ID: 1888H Project ID:	Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri Location: Hämeenlinna, Hauho Trial Year: 2018 Investigator: Milla Valisalo Study Director: Juho Urkko Sponsor Contact:
--	--

Crop Code			AVESA	AVESA	AVESA	
Crop Name			Common oat	Common oat	Common oat	
Part Rated			GRAIN -	GRAIN -	GRAIN -	
Rating Date						
Rating Type			TKW	HLW	CONPRO	
Rating Unit			g	kg	%	
Crop Stage Majority						
Days After First/Last Applic.						
Days After Emergence						
ARM Action Codes			APoC	APoC	APoC	
Number of Decimals			1	1	1	
Trt No.	Treatment Name	Rate	Appl Code	11*	12*	13*
	0 kg N/ha			39,5 ab (100,0%)	53,7 - (100,0%)	11,6 a (100,0%)
2	Ecolan Agra	40 kg ai/ha	A	40,0 a (101,4%)	53,7 - (99,9%)	11,1 b (96,0%)
3	Ecolan Agra Ecolan Agra BactoBoost	40 kg ai/ha	A A	39,0 ab (98,7%)	53,7 - (99,9%)	11,1 b (95,7%)
4	Ecolan Agra ZM Grow	40 kg ai/ha 1 l/ha	A B	38,6 ab (97,9%)	53,7 - (99,9%)	11,3 ab (97,4%)
5	Ecolan Agra	80 kg ai/ha	A	38,5 b (97,6%)	53,4 - (99,3%)	11,3 ab (97,7%)
6	Ecolan Agra Nutrilife	40 kg ai/ha 1 l/ha	A B	39,9 a (101,2%)	53,7 - (100,0%)	11,4 ab (98,0%)

Agricultural Foundation of Trade

Trial ID: 1888H_kaura_Ecolan_agra Protocol ID: 1888H Project ID:	Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri Location: Hämeenlinna, Hauho Trial Year: 2018 Investigator: Milla Valisalo Study Director: Juho Urkko Sponsor Contact:
--	--

Crop Code	AVESA	AVESA	AVESA
Crop Name	Common oat	Common oat	Common oat
Part Rated	GRAIN -	GRAIN -	GRAIN -
Rating Date			
Rating Type	TKW	HLW	CONPRO
Rating Unit	g	kg	%
Crop Stage Majority			
Days After First/Last Applic.			
Days After Emergence			
ARM Action Codes	APoC	APoC	APoC
Number of Decimals	1	1	1
Trt Treatment	Rate	Appl	
No. Name	Unit	Code	
			11* 12* 13*
7 Ecolan Agra	40 kg ai/ha A		
Fosfix	1 l/ha B		
			39,4 ab 53,4 - 11,4 ab (99,7%) (99,4%) (98,0%)
LSD P=.05	0,93	0,45	0,26
Standard Deviation	0,52	0,25	0,14
CV	1,33	0,47	1,27
Levene's F	0,378	0,784	0,283
Levene's Prob(F)	0,881	0,596	0,936
Skewness	0,4829	0,3566	-0,3182
Kurtosis	-1,1391	0,1834	-0,6104
Replicate F	1,953	7,858	45,243
Replicate Prob(F)	0,1844	0,0066	0,0001
Treatment F	3,960	1,254	4,046
Treatment Prob(F)	0,0204	0,3467	0,0189

Agricultural Foundation of Trade

Kauran luomulannoitekoe - Ecolan Agra ja Lantmännen BioAgri

Trial ID: 1888H_kaura_Ecolan_agra
Protocol ID: 1888H
Project ID:

Location: Hämeenlinna, Hauho Trial Year: 2018
Investigator: Milla Valisalo
Study Director: Juho Urkko
Sponsor Contact:

Crop Code

AVESA, BCER, Avena sativa, Common oat = US

Part Rated

PLOT = plot
PLANT = plant
GRAIN = grain

Rating Type

DENSIT = density
HEIGHT = height
EAREME = ear emergence
SENESE = senescence
YIELD = yield
TKW = weight thousand kernel
HLW = weight 100 Ltr (hl)
CONPRO = content - protein

Rating Unit

% = percent
cm = centimeter
DAP = days after planting
kg/ha = kilograms per hectare
g = gram
kg = kilogram

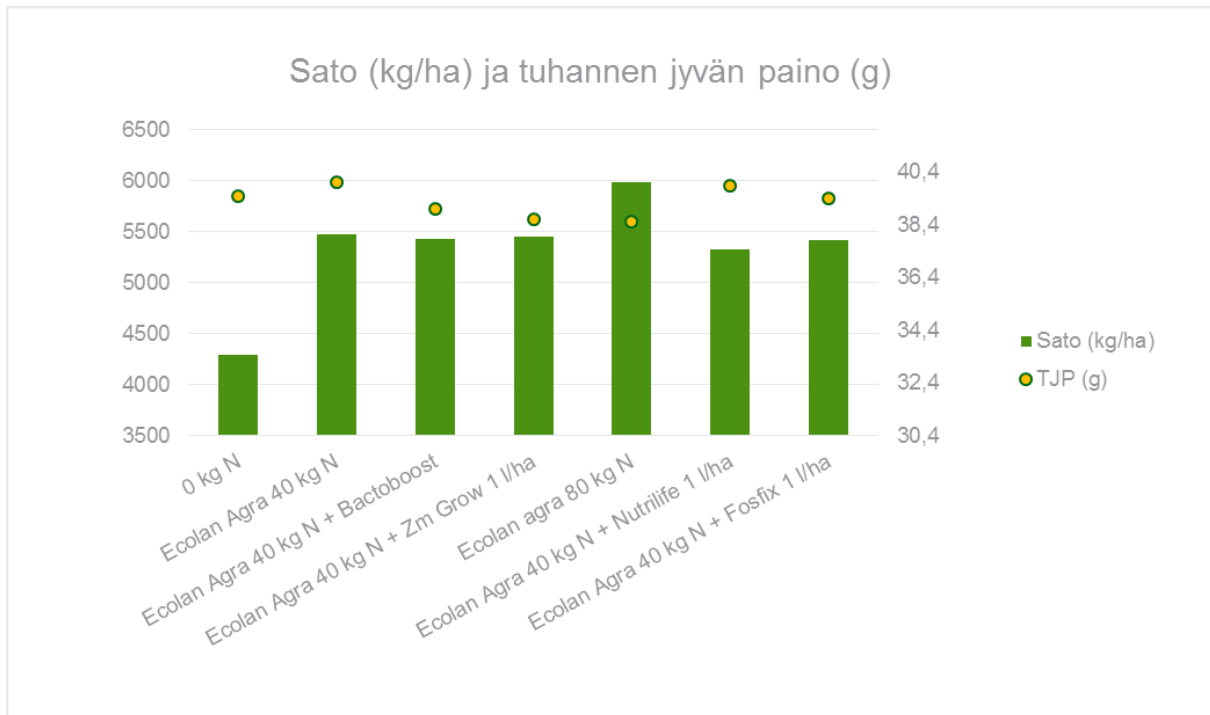
ARM Action Codes

P = Rating scale of 0 to 100 (e.g. % control or injury)
APC = Automatic percent control (Control forced to 0% on AOV Means Table)
APoC = Automatic percent control (Control forced to 100% on AOV Means Table)
TL[5] = LOG([5]+ 1)
TL[7] = LOG([7]+ 1)
TL[9] = LOG([9]+ 1)

1888 Kauran luomulannoituskoe



Kuva 1. Vasemmalla lannoittamaton kontrolli ja oikealla Ecolan Agra 40 kg N.



Kuvaaja 1. Sato (kg/ha) ja tuhannen jyvän paino (g).