

KREOTEC

KREOTEC Case Study GHG Emissions & Yield Wheat Italy 2020

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**25% REDUCTION IN GHG EMISSIONS
PER TONNE OF GRAIN WITH
KREOTEC APPLICATION**



**RESULTED IN THE SAME YIELD BUT
SAVED 70KG/HA NITROGEN PLUS
APPLICATION COSTS**

Italy, wheat demo trial, Bologna
Results reported September 2020

Objective of trial:

Field scale site to evaluate the effects of KREOTEC on the yield of wheat on a 1ha demonstration plot

Location: Bologna

Treatments:

1. Control with standard fertiliser (pre-sowing and at tillering)
2. KREOTEC applied at 200g/ha at 4-6 leaf stage with standard fertiliser pre-sowing (zero fertiliser at tillering)

Relevant agronomy:

The variety sown appears to be a winter wheat (Giorgione), selected from CFT list as such.

The standard pre-sowing fertiliser was 250kg urea (46%) and 200kg ammonium nitrate (34.2%) at tillering.

N fertiliser rates:

- 250kg urea = 115kg N/ha
- 200kg ammonium nitrate = 70kg N/ha

Crop protection: Herbicide was applied across all plots at tillering (assume one active)
No irrigation was used.
Sowing and harvest dates unknown
No soil properties known.

Yield:

1. Control – 7.60 t/ha
2. KREOTEC – 7.62 t/ha

Greenhouse gas estimation:

The Cool Farm Tool (<https://coolfarmtool.org/>) was used to estimate GHG emissions (web portal, accessed 10 Dec 2020), using the parameters listed above.

CONTROL GHC EMISSIONS AND YIELD

EMISSIONS PER HECTARE 1.97k kg CO ₂ e	EMISSIONS PER TONNE 259.36 kg CO ₂ e	YIELD 7.60 kg/ha
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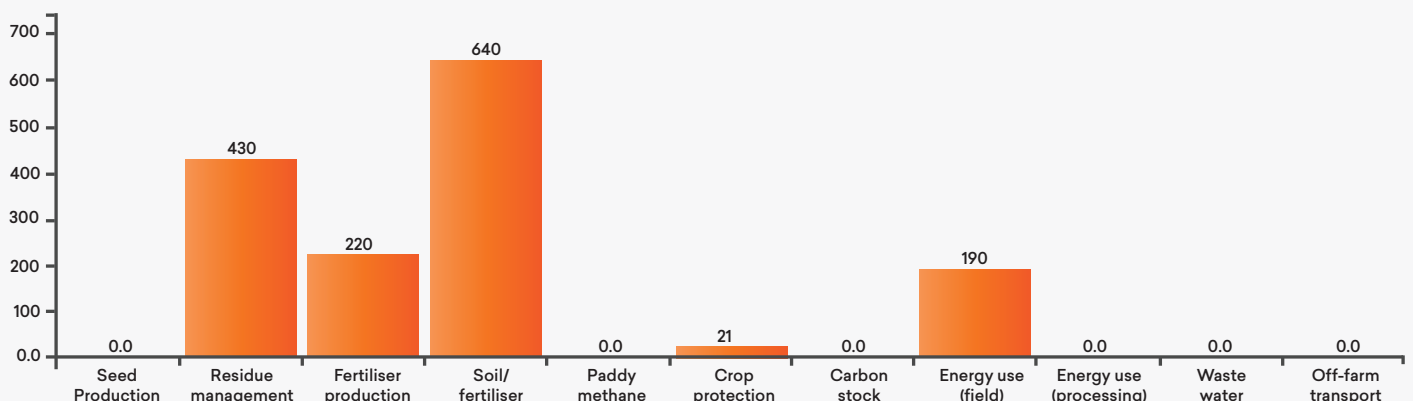
Total Emissions (Kg CO₂e)



KREOTEC GHC EMISSIONS AND YIELD

EMISSIONS PER HECTARE 1.50k kg CO ₂ e	EMISSIONS PER TONNE 196.71 kg CO ₂ e	YIELD 7.62 kg/ha
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Total Emissions (Kg CO₂e)



Control GHC emissions detailed data (all values in kg)

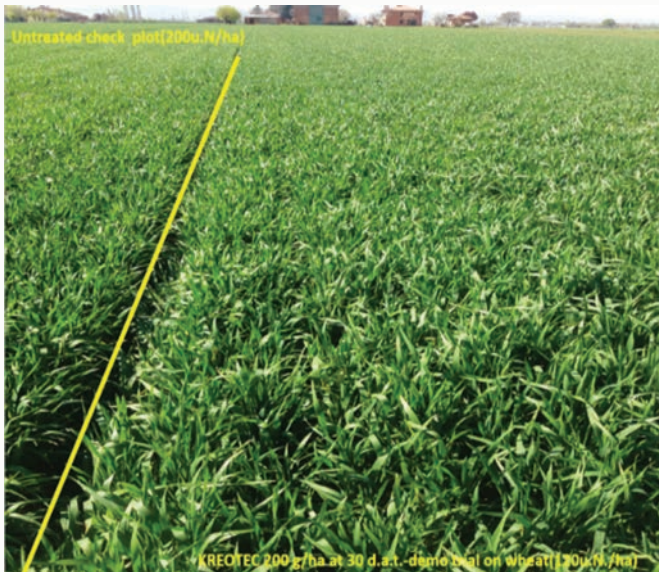
Sources	CO ₂	N ₂ O	CH ₄	Total CO ₂ eq	Per ha	Per tonne
Seed production	0	0	0	0	0	0
Residue management	0	1.43	0	426.66	0	56.14
Fertiliser production*	453.23	0	0	453.23	0	59.64
Soil/fertiliser	183.33	2.29	0	864.61	0	113.77
Paddy methane	0	0	0	0	0	0
Crop protection	20.50	0	0	20.50	0	2.70
Carbon stock changes	0	0	0	0	0	0
Energy use (field)	206.16	0	0	206.16	0	27.13
Energy use (processing)	0	0	0	0	0	0
Waste water	0	0	0	0	0	0
Off-farm transport	0	0	0	0	0	0

*Calculated with validated default values for fertiliser production.

KREOTEC GHC emissions detailed data (all values in kg)

Sources	CO ₂	N ₂ O	CH ₄	Total CO ₂ eq	Per ha	Per kg
Seed production	0	0	0	0	0	0
Residue management	0	1.43	0	426.66	426.66	55.99
Fertiliser production*	219.50	0	0	219.50	219.50	28.81
Soil/fertiliser	183.33	1.54	0	642.44	642.44	84.31
Paddy methane	0	0	0	0	0	0
Crop protection	20.50	0	0	20.50	20.50	2.69
Carbon stock changes	0	0	0	0	0	0
Energy use (field)	189.87	0	0	189.87	189.87	24.92
Energy use (processing)	0	0	0	0	0	0
Waste water	0	0	0	0	0	0
Off-farm transport	0	0	0	0	0	0

*Calculated with validated default values for fertiliser production.



Assumptions used in the calculation:

1. No land use, management or cover crop change in the last 20 years
2. All residue management is standard (default residue is 11.29t/ha)
3. Residue distributed, incorporated or mulched
4. Land size is 1ha
5. Soil type: medium (silt)
6. Soil moisture average: moist
7. Soil pH: 5.5 – 7.3
8. Soil OM value: 1.72 – 5.16 %
9. Drainage: good
10. Fertiliser manufactured in Europe (2014 benchmark)
11. CFT fertiliser management – pre-sowing urea applied as ‘incorporated by sowing’, tillering ammonium nitrate applied as ‘broadcast’.
12. No emissions inhibitors listed.
13. CFT standard ammonium nitrate is listed as 33.5% N. As the product applied was 34.2%, rate of application was adjusted from 200kg product to 204.2 kg/ha
14. An herbicide was applied at tillering. Assume 1 active.
15. No transport included

Diesel usage – based on best bet machinery selection from CFT

- Pre-sowing ploughing – disc harrows – 5.24 L/ha
- Sowing – grain drill, - 0.35 L/ha
- Fertiliser spreading x 2 (pre-sowing and at tillering) – 15.20 L/ha
 - o Kreotec tretment only had one fertiliser spreader pass – 7.60 L/ha
- Herbicide spraying – 1.40L/ha
- Kreotec only – (‘biocide spraying) – 1.40 L/ha
- Harvesting – combine – 54.74 L/ha