Minimum Tillage

and environmental aspects (permanent - evergreen arable land) in Lower Austria and Vysocina

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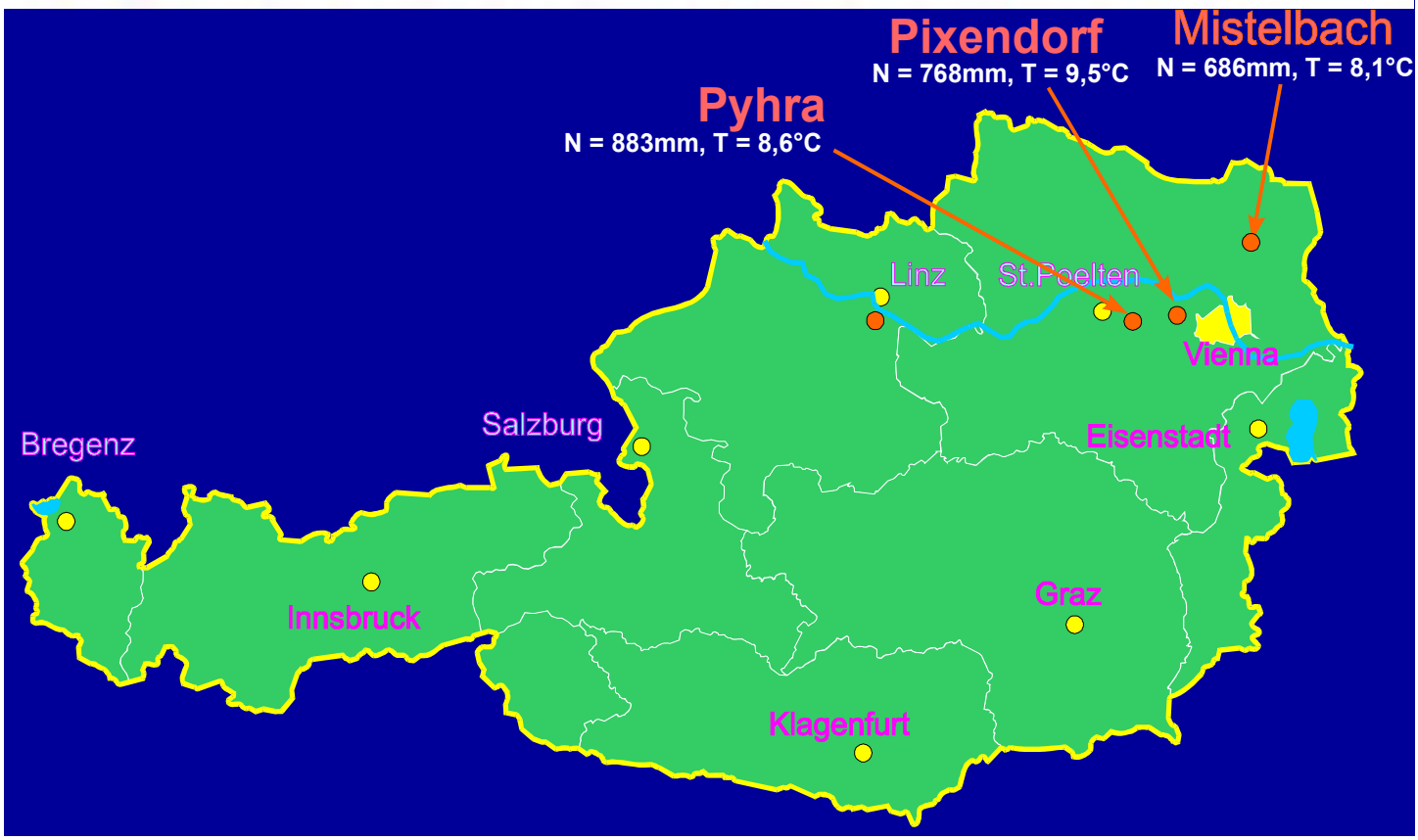
Soil erosion and tillage trials measurement sites Lower Austria



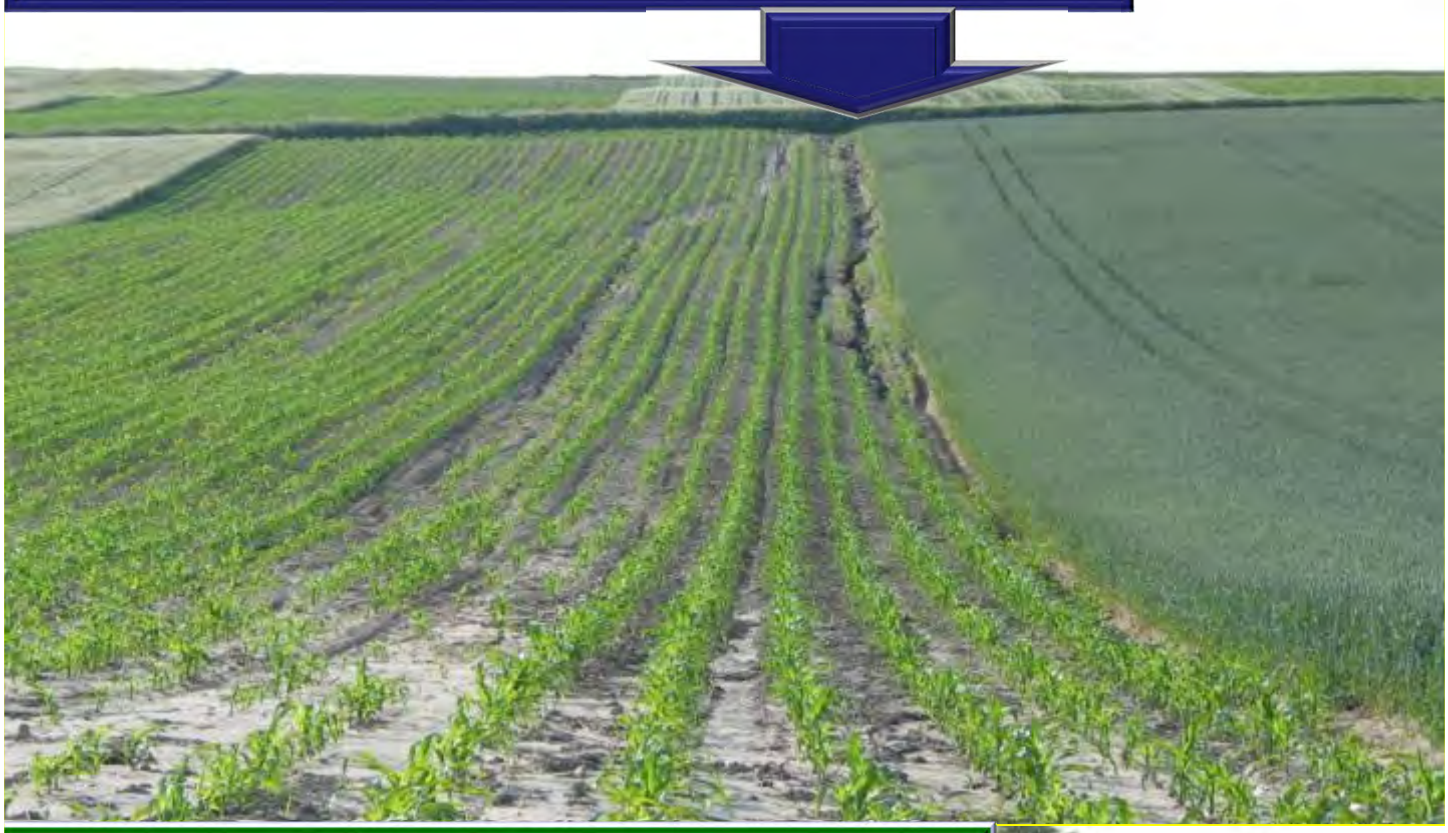
↑

Perched water table

in the depression

Interrillerosion

Tulln Conventional drilling gully erosion



Direct drilling ⇒ erosion control

SOLUTION ⇒

Direct drilling with/without disc harrow in front of seeder

No till drill into straw of winter wheat

Yellow mustard + California bluebell – Phacelia as cover crops


Legumes

Seed cover crops into stubbles of winterbarley Hollabrunn Juli 12th 2012

Developement cover crops Hollabrunn 4 weeks after seed

Cover crops Hollabrunn August 29th 2012

Nodule bacteria

> 70 t organic matter per ha
November

Cover crop roller developed and constructed in Lower Austria (Hahnekamp, Rosner)

instead of shredding ⇒ lower fuel consumption and more capacity

Roller to squeeze cover crops in fall – reduction of water consumption

Directseed cornplanting into Legume – cover crops
Tulln April 2012

Kuhn Maxima with coulter discs

Corn directseed with Väderstad Tempo with coulter discs NoTill - farm Zaussinger

May 1st 2012


No Till corn planted into freeze cover crops

Field emergence TulIn 2012

Field emergence NoTill
Farm Zaussinger 2012

Cooperation Region Vysocina and Lower Austria

Directseed Corn into straw residues winterrye Humpolec 2012

Directseed silage corn into straw residues winterrye Humpolec 2012

Silage corn in Glyphosate – sprayed winterrye Humpolec CS

September 2012

Directseed winterrye into yellow mustard + California Bluebell cover crops

Variants

- Directseed 03.10.2011
- Directseed + Round up 26.09.2011
- Knife roller – Directseed 28.09.2011
- Knife roller + Round up – Direktsaat
- Mulchshredder – Directseed
- Mulchshredder + Round uo – Directseed
- Mulchshrtedder – discharrow - Mulchseed

Variety

Minello Hybrid
90 %

+

Dukato

10 %

300
seedcorns/m²

Directseed without Round up (Glyphosate)

Directseed without Round up

Coulterdiscs instead of discharrow

Directseed after Round up spraying

Directseed without Round up

NoTill without Round up


NoTill knife roller

Yield 2012….5.000 kg/ha…..+ 20 % conventinal

Seed winterwheat into legume – cover crops
Tulln Oktober 12th 2012 without Glyphosate

Seed winterwheat into legume – cover crops Tulln Oktober 12th 2012 without Glyphosate

Direct drilling without seed currycomb and coulter discs Tulln October 2012

→ Roller after seed

Without – with currycomb


Cambridge roller for pressing
the seed into the soil

Field emergence direct drilling winterwheat into legume cover crops without Glyphosate
TulIn November 5th2012

Winterwheat in the cover crop residues – protected soil

April 15th 2013 Winter wheat tillering

April 15th 2013 Winter wheat tillering

Conventional tillage with plow

NoTillage

Field demonstrations Lower Austria

2009 2010 2011 2012

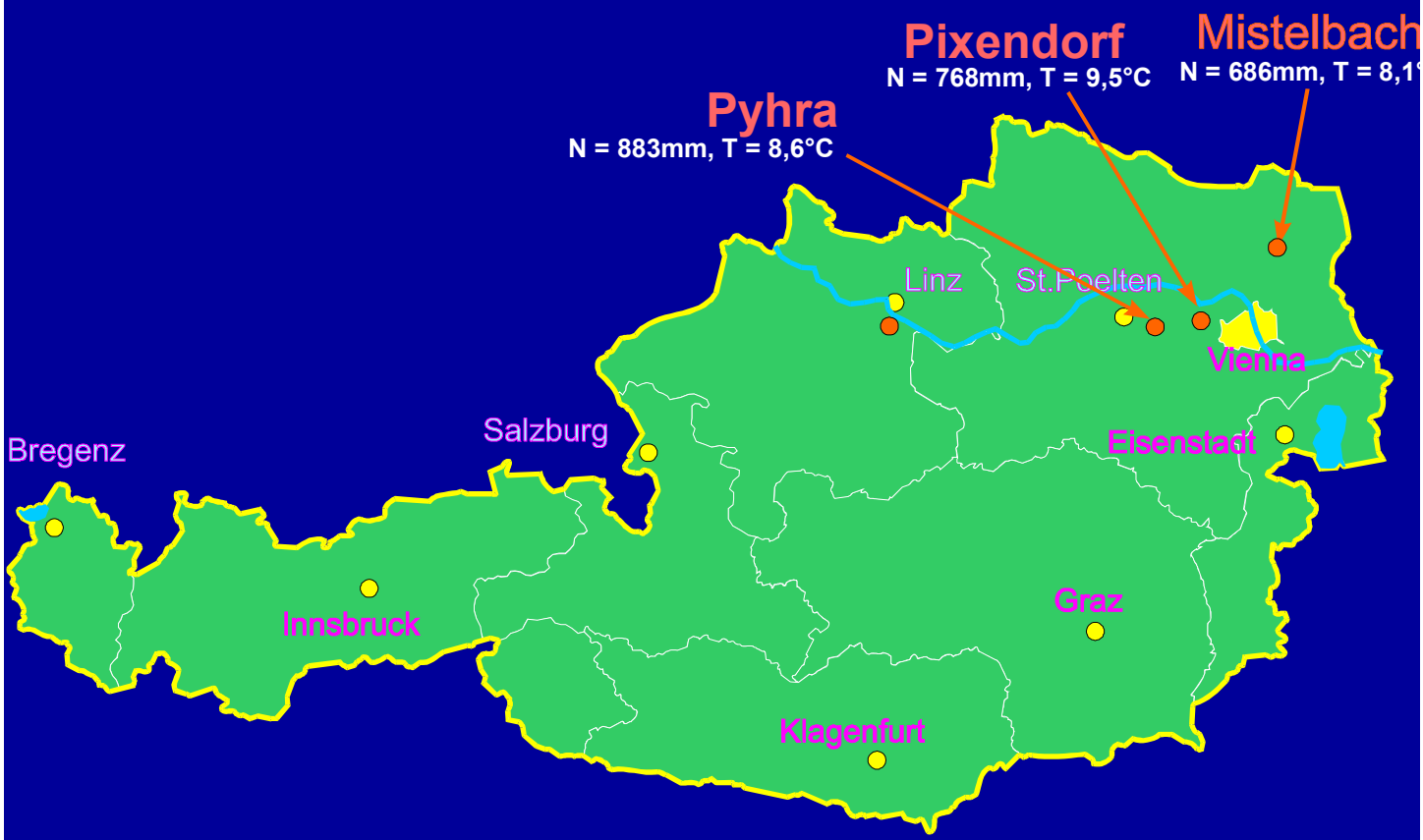
25th June 2013 Donnerskirchen Burgenland


NoTill Soybean in cornstraw Argentina
Internatinal wide spread - > 130 Mio. ha NoTillage

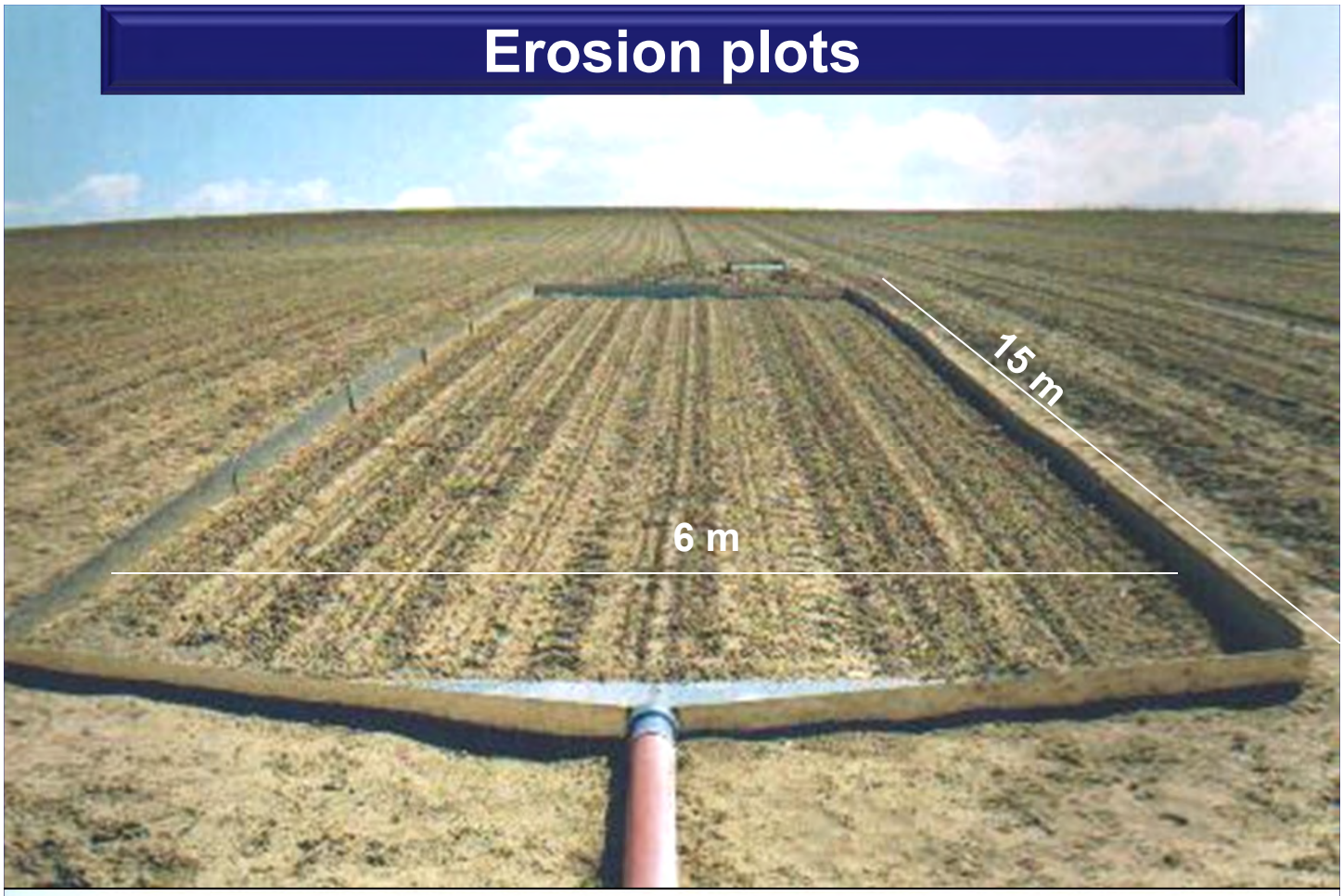
Cultivation soybean into stubbles of barley NoTill Brasil

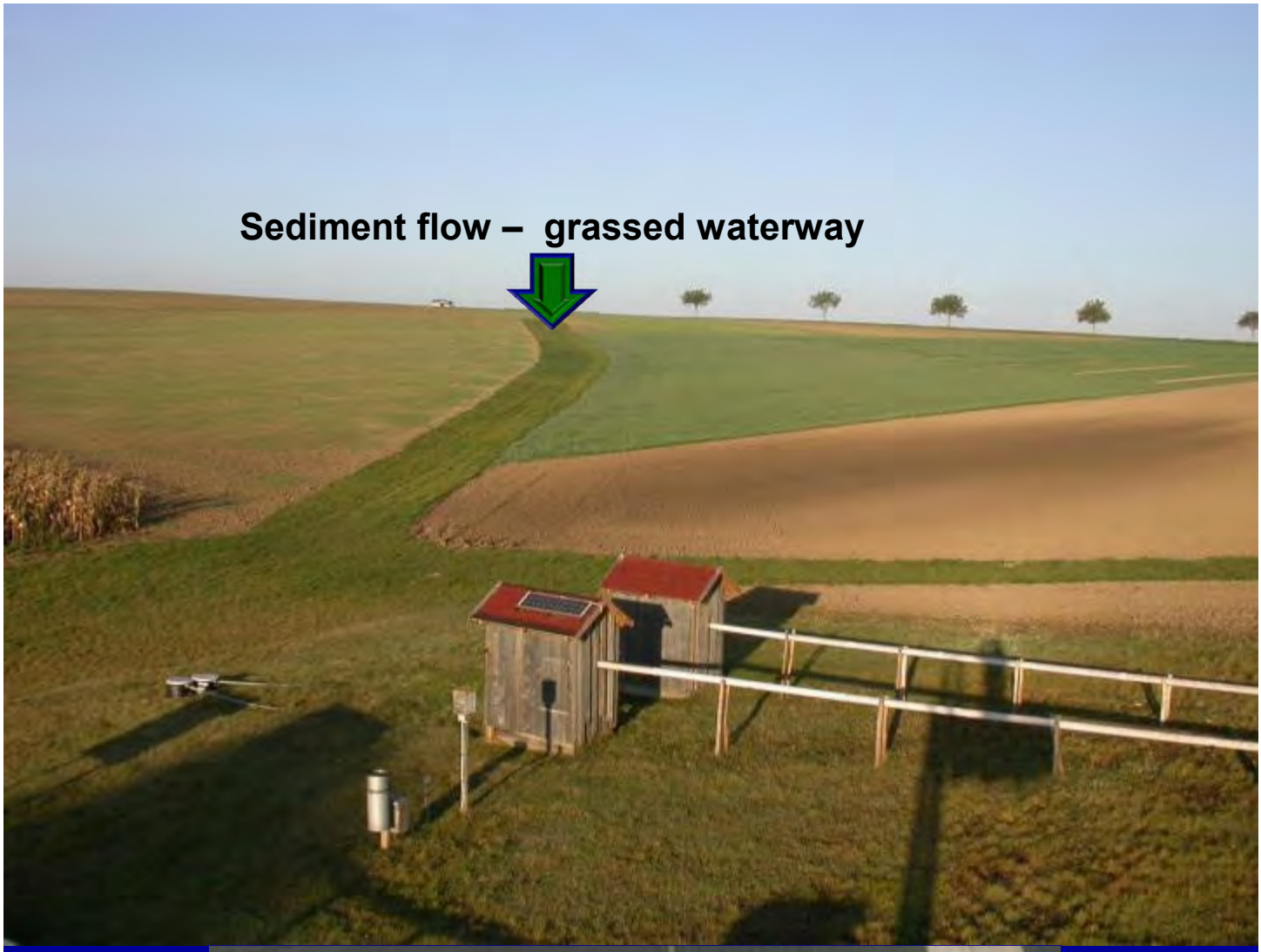
Cultivation soybean NoTill Brasil

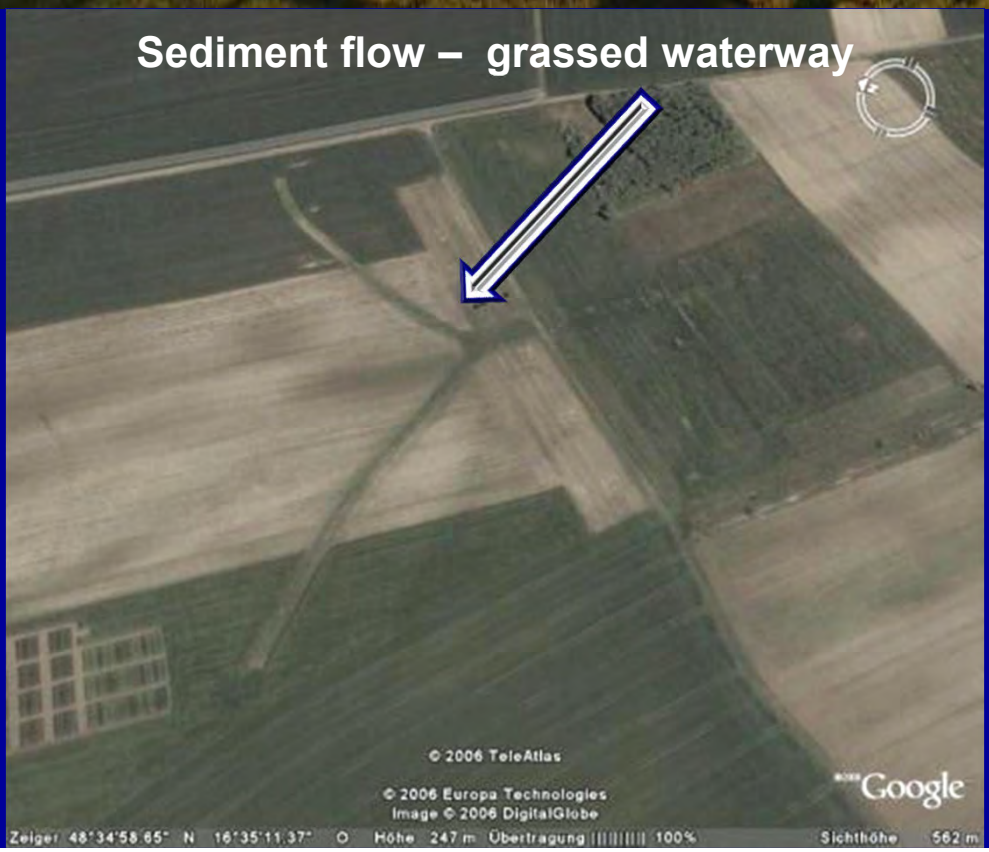
Soil erosion measurement sites Austria



Erosion plots




Sediment flow – grassed waterway

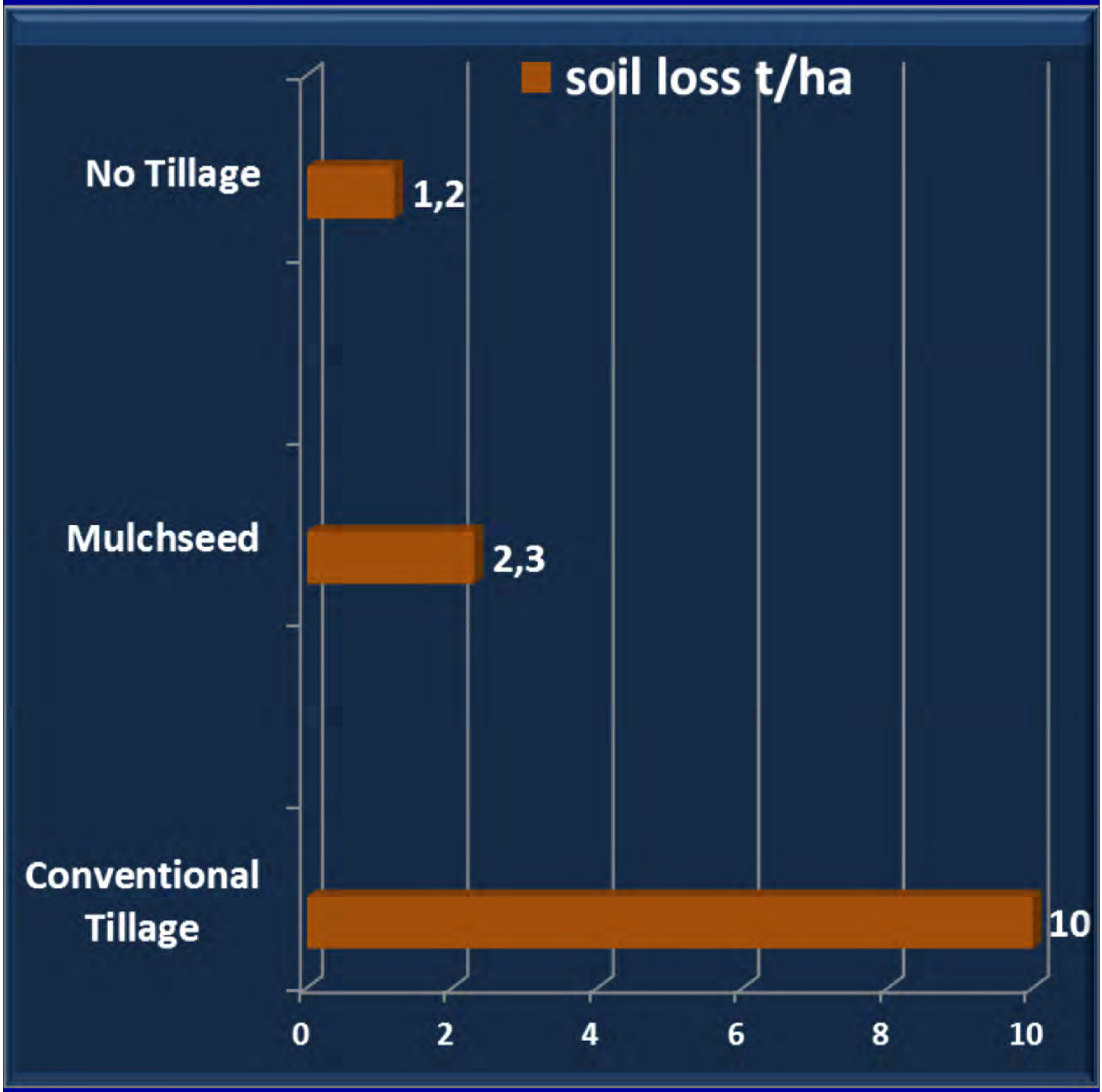

Sediment flow – grassed waterway
© 2006 TeleAtlas
© 2006 Europa Technologies
Image © 2006 DigitalGlobe
Google
Zeiger 48°34'58.65" N 16°35'11.37" O Höhe 247 m Übertragung 100% Sichthöhe 562 m

Sample divider

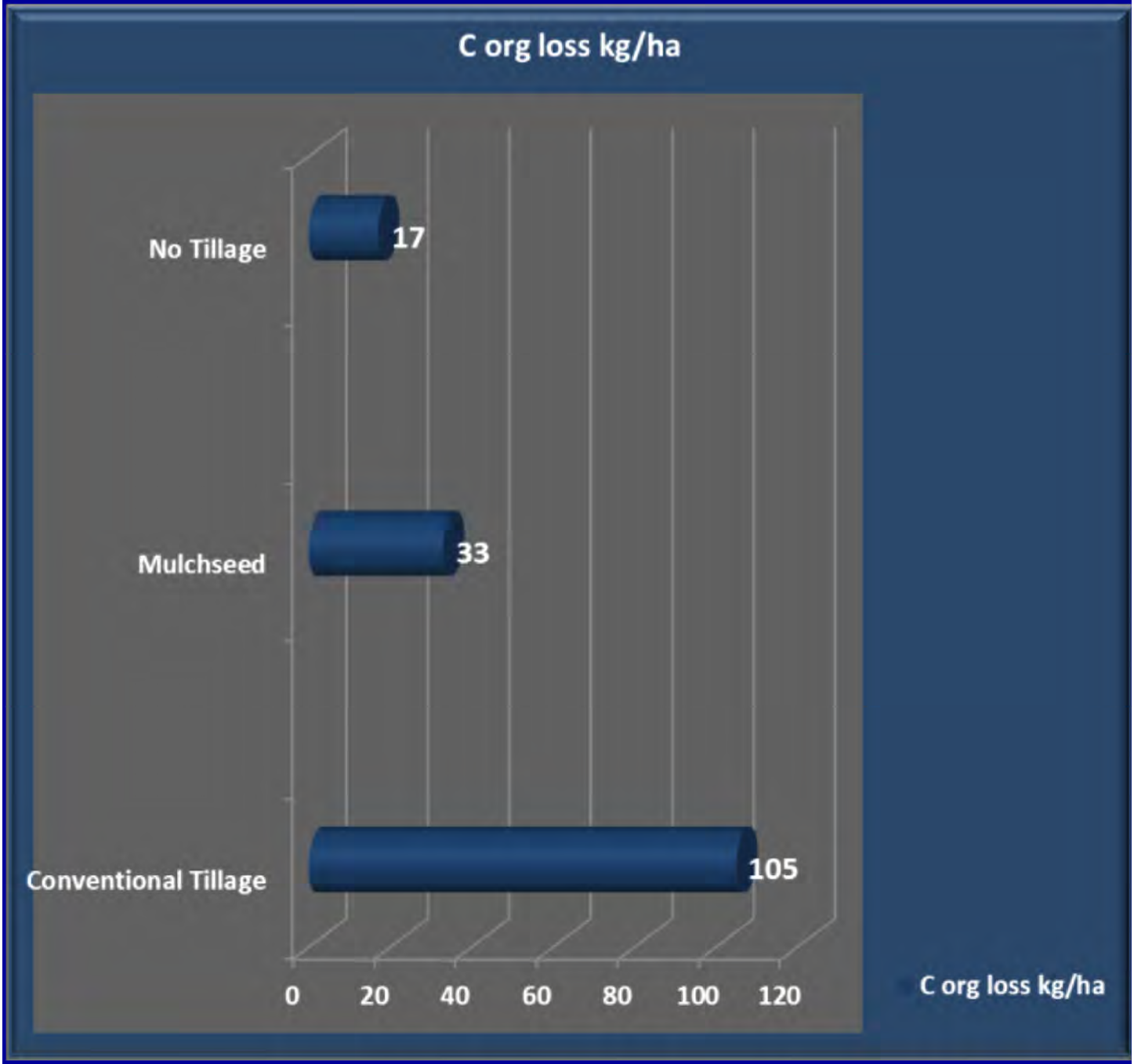
Sedimentcollector

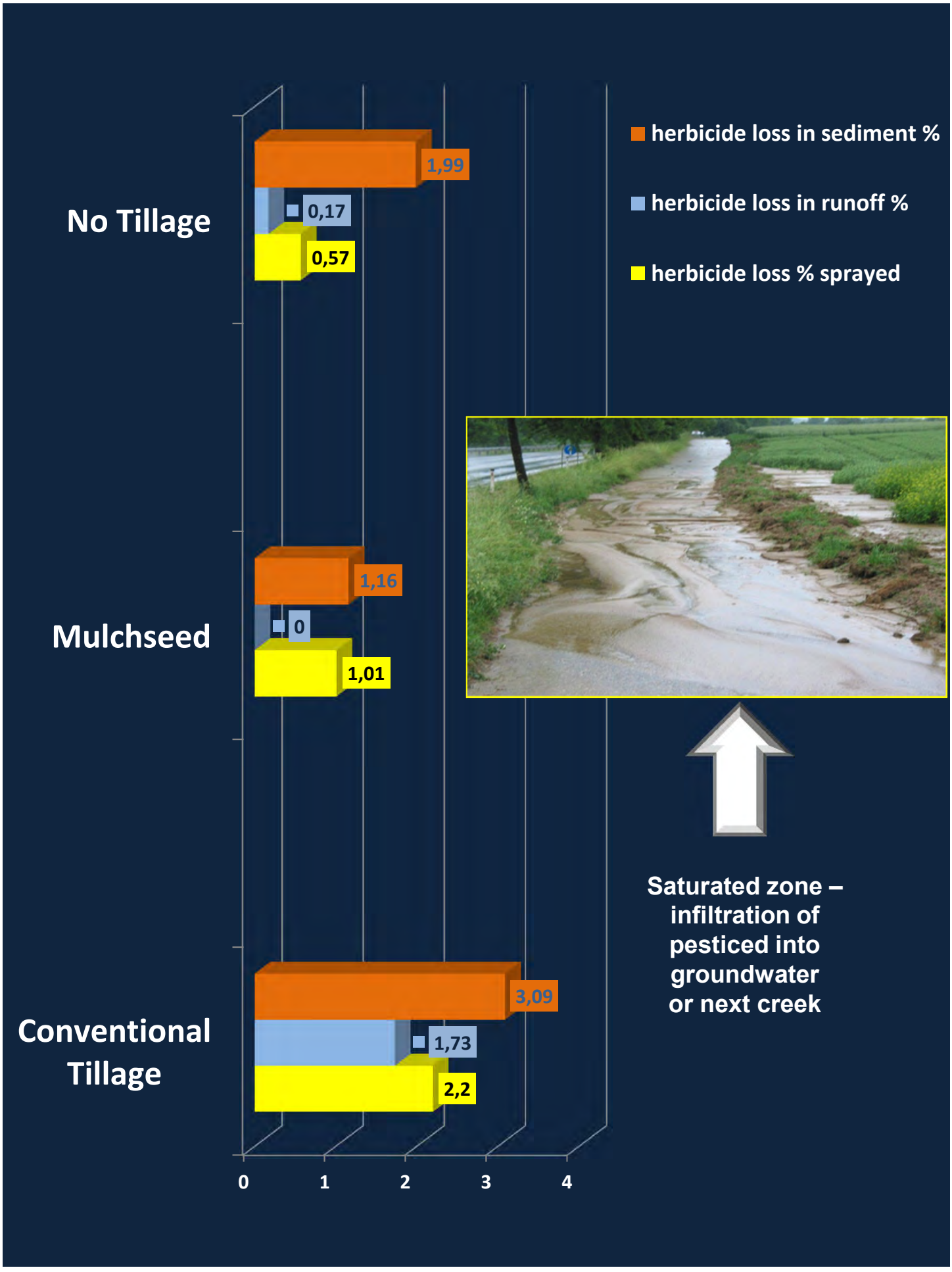
3 % sampled – divided by tubes

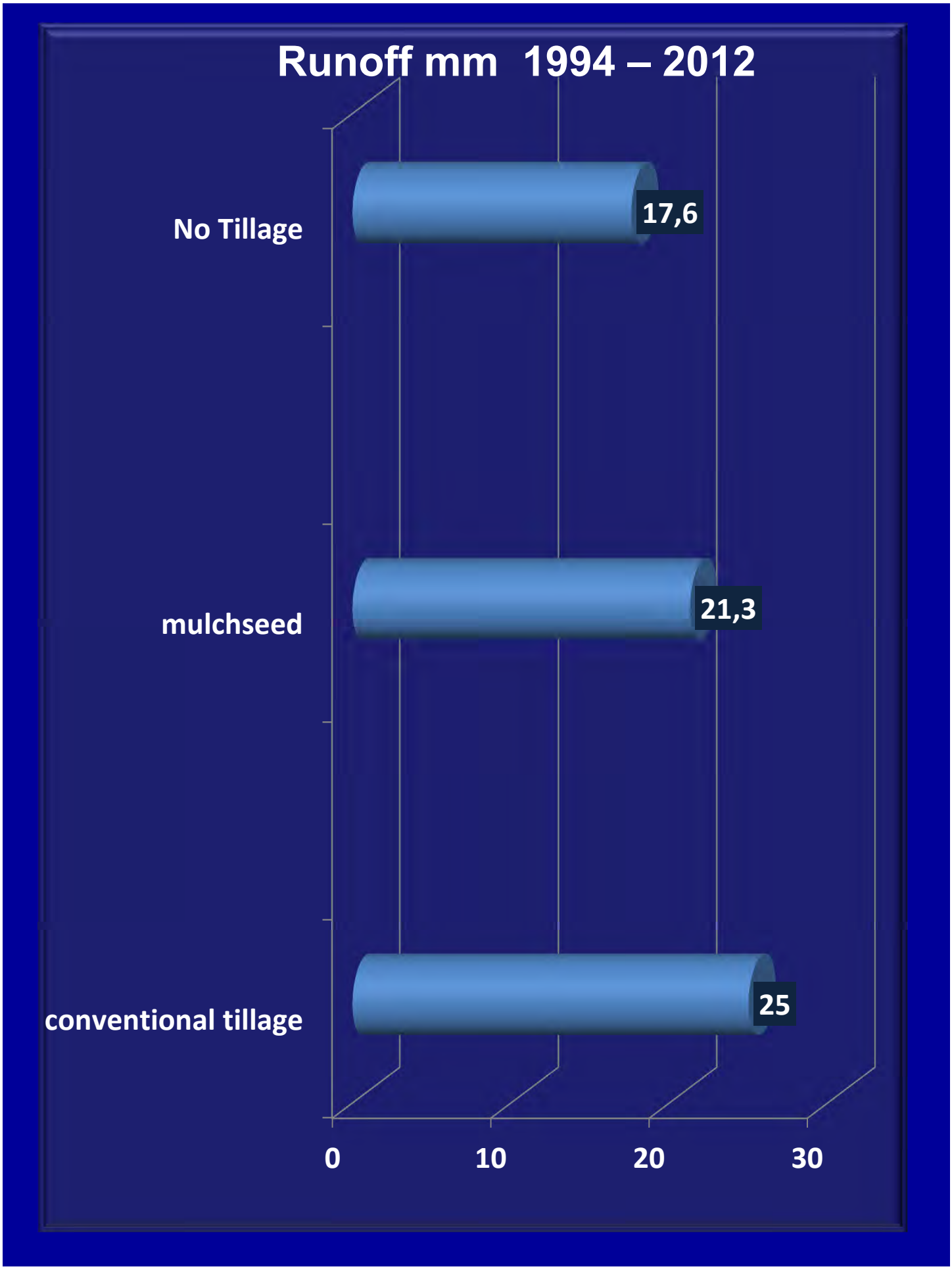
Soil loss 2 places Lower Austria 1994 - 2012



Organic Carbon Losses Corg kg/ha/year




herbicide loss in sediment %
herbicide loss in runoff %
herbicide loss % sprayed
No Tillage
1,99
0,17
0,57
Mulchseed
1,16
0
1,01
Conventional Tillage
3,09
1,73
2,2
0
1
2
3
4
Saturated zone – infiltration of pesticed into groundwater or next creek

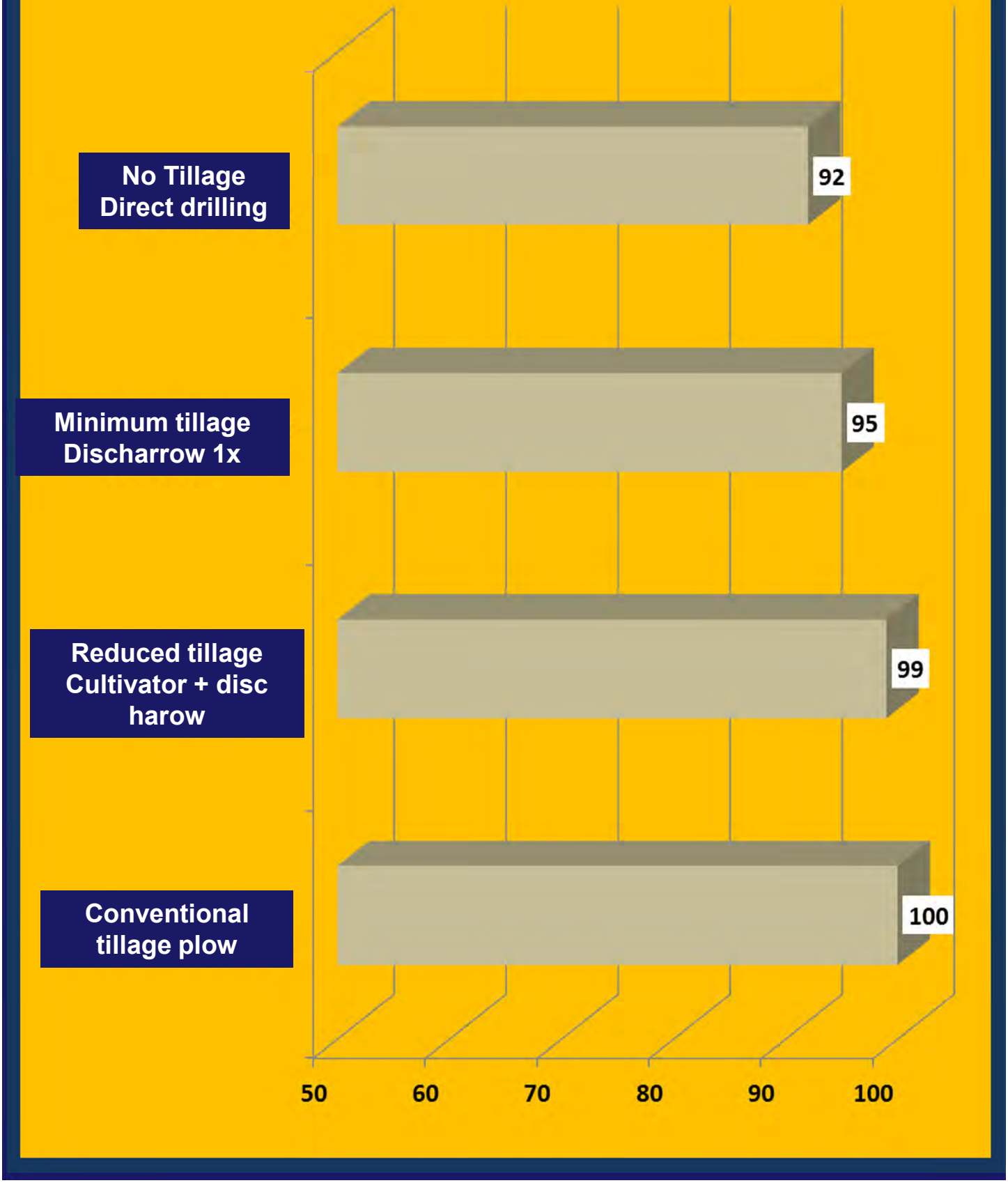

Runoff mm 1994 – 2012
No Tillage
17,6
mulchseed
21,3
conventional tillage
25
0
10
20
30

Yield in relative % 1994 – 2012 Mistelbach-Pyhra(St.Pölten)-Pixendorf(Tulln)

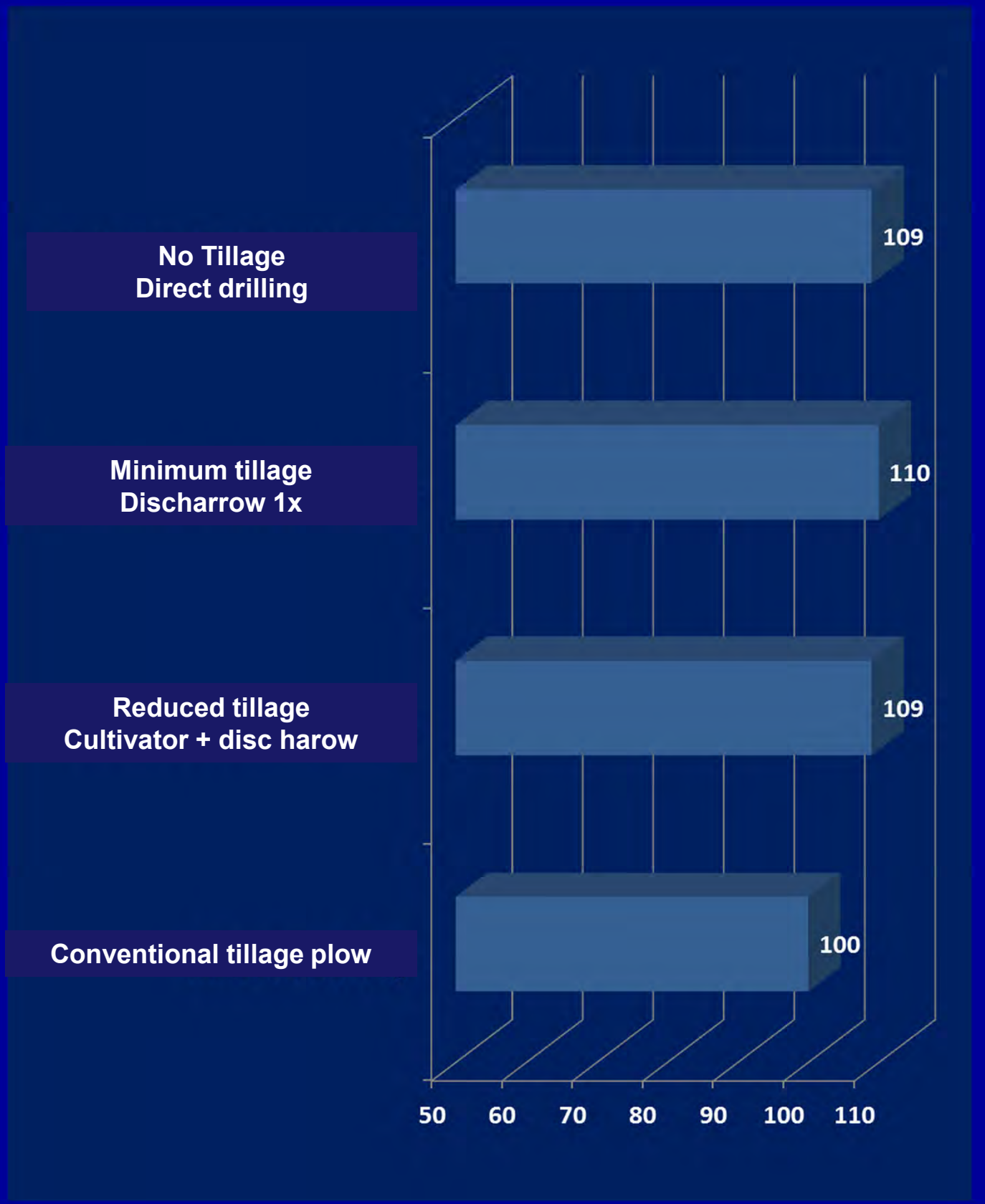
Rosner, Zwatz, Bartmann, Spieß, Ofner, Deix

Tillage method/ Yield kg per ha	Mistelbach	Pyhra	Pixendorf
Conventional **Cultivator – plow** **No cover crop**	**100**	**100**	**100**
Cultivator – Mulchseed – Cover Crop: yellow mustard, california bluebell, buckwheat, red clover, oil radish	**96**	**102**	**103**
direct drilling Cover crop : 7 kg/ha California Bluebell, 3 kg/ha Yellow Mustard	**93**	**109**	**106**
direct drilling cover crop : 80 kg/ha winter rye	**89**	**103**	**98**
Cultivator – direct drilling Cover crop :120 kg/ha summer barley	**97**	**108**	**112**

Yield tillage – trials 1994 – 2012 3 sites Lower Austria

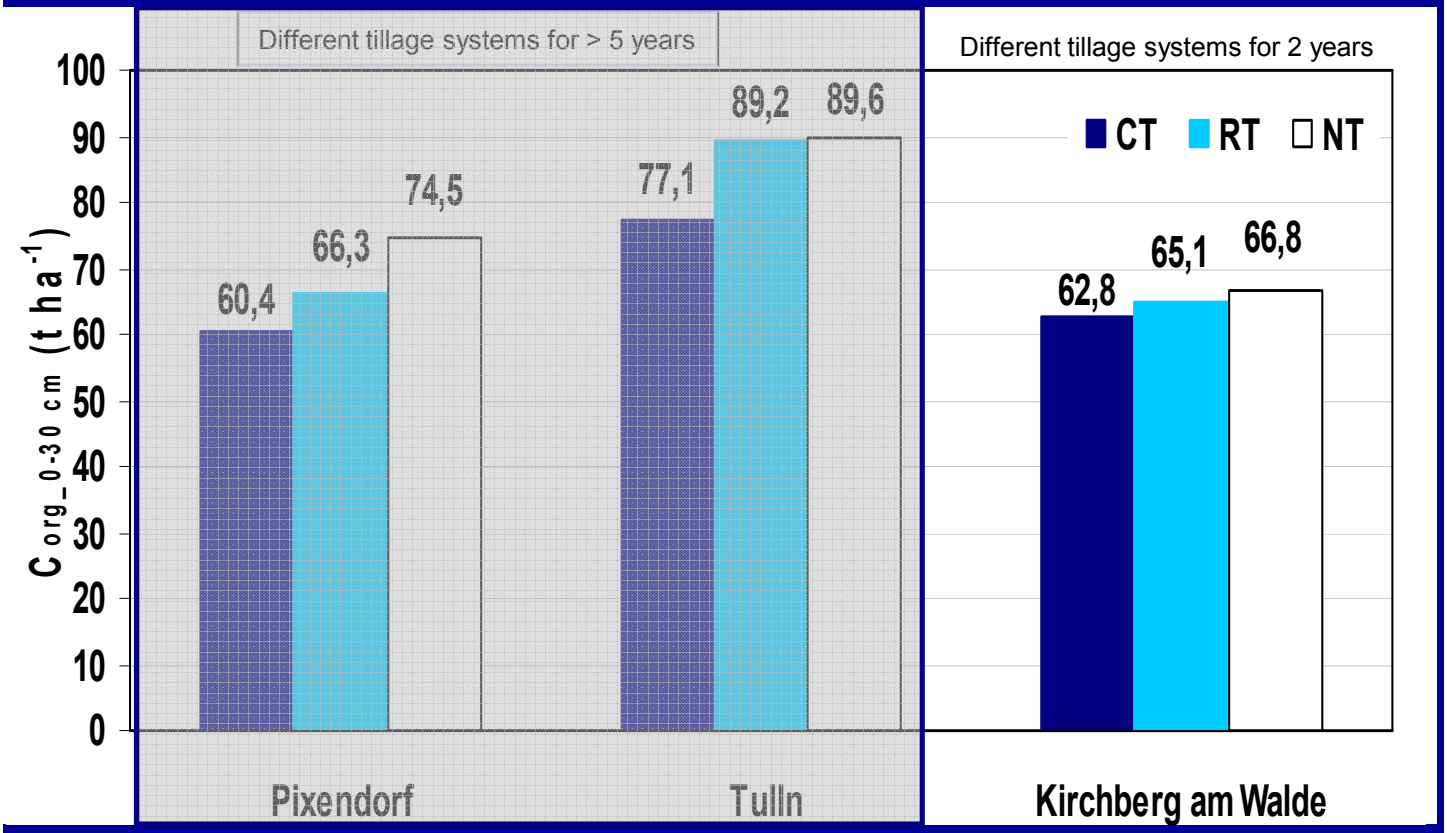


Net profit tillage trials 5 sites Lower Austria several years

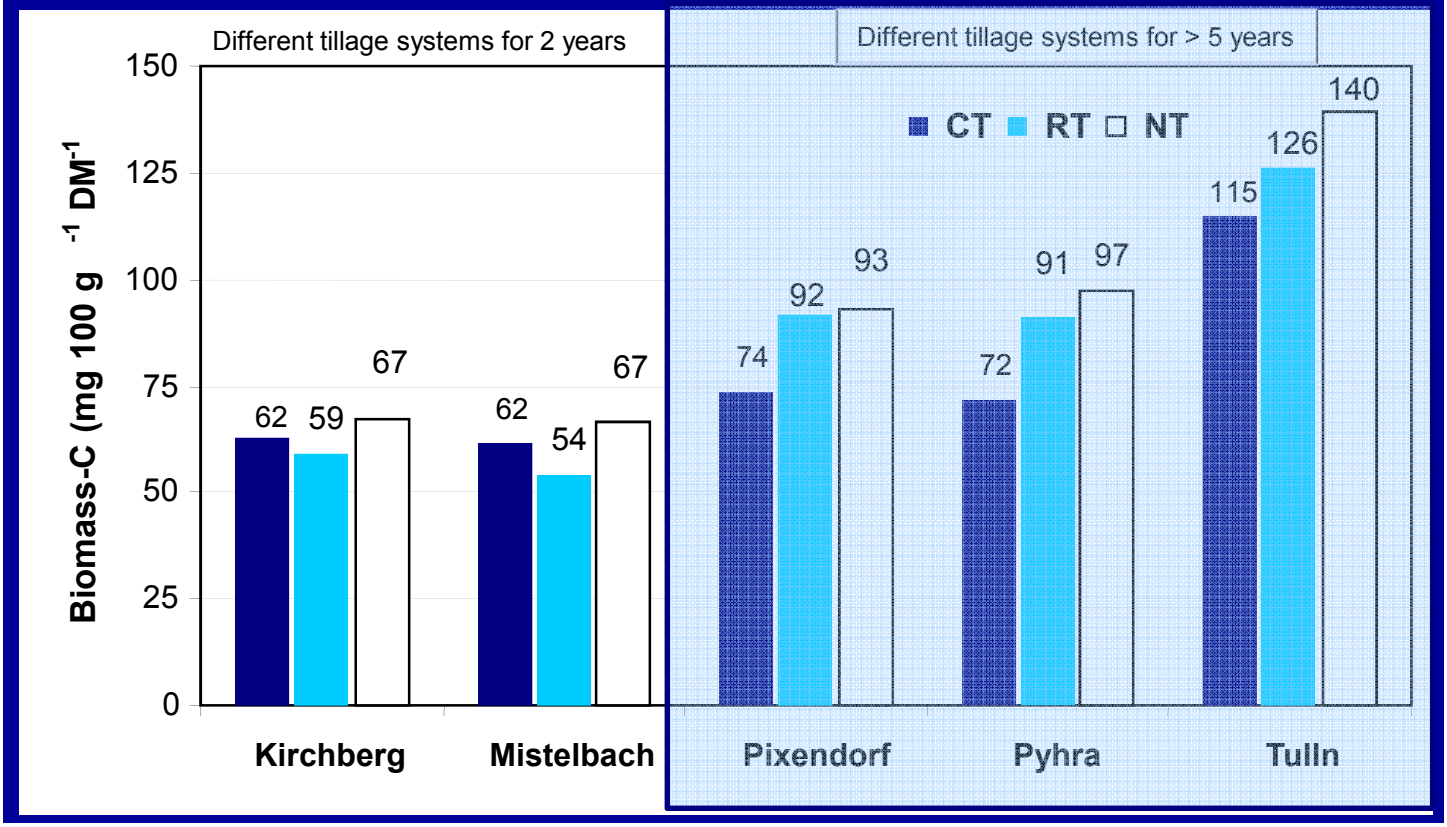


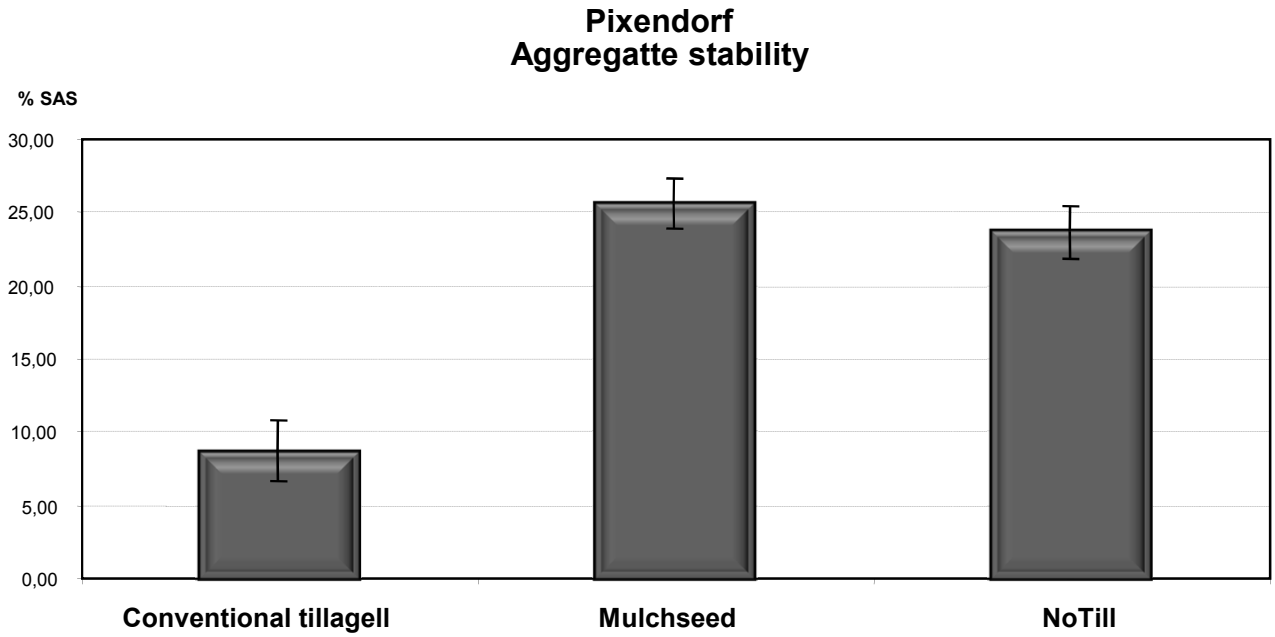
Organic Carbon in soil 0 – 30 cm

(Trümper G. u. A. Klik)



Microbial Biomass (mg Biomass-C 100 g-1 dry matter-1 (DM) (Klik et al.)

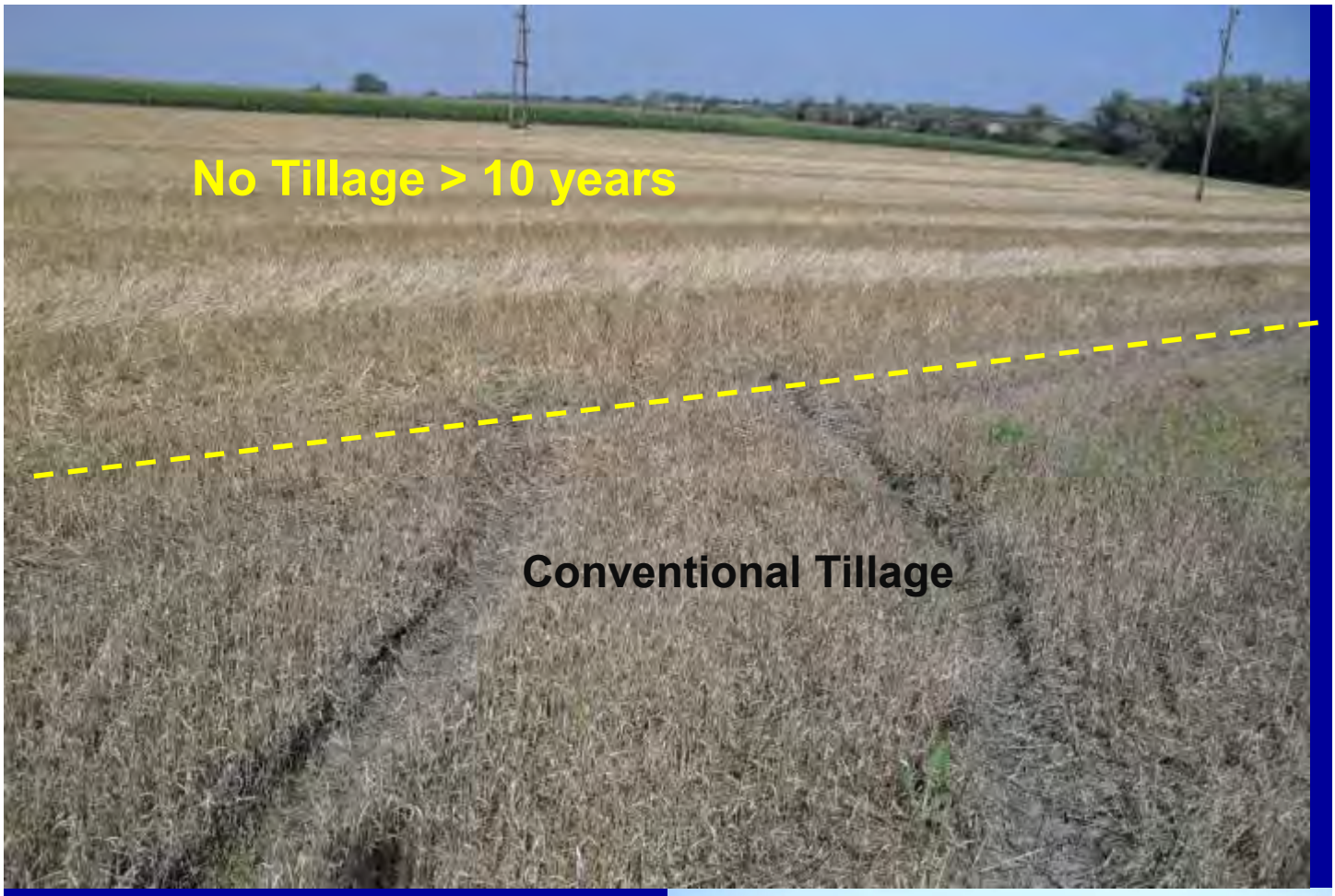


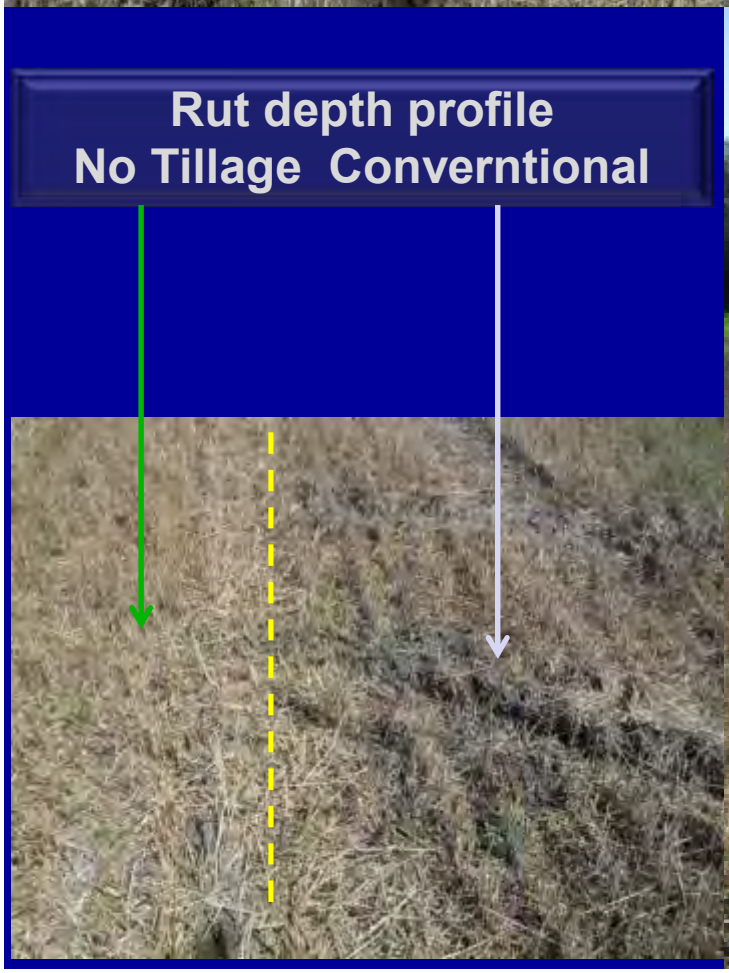


N = 9

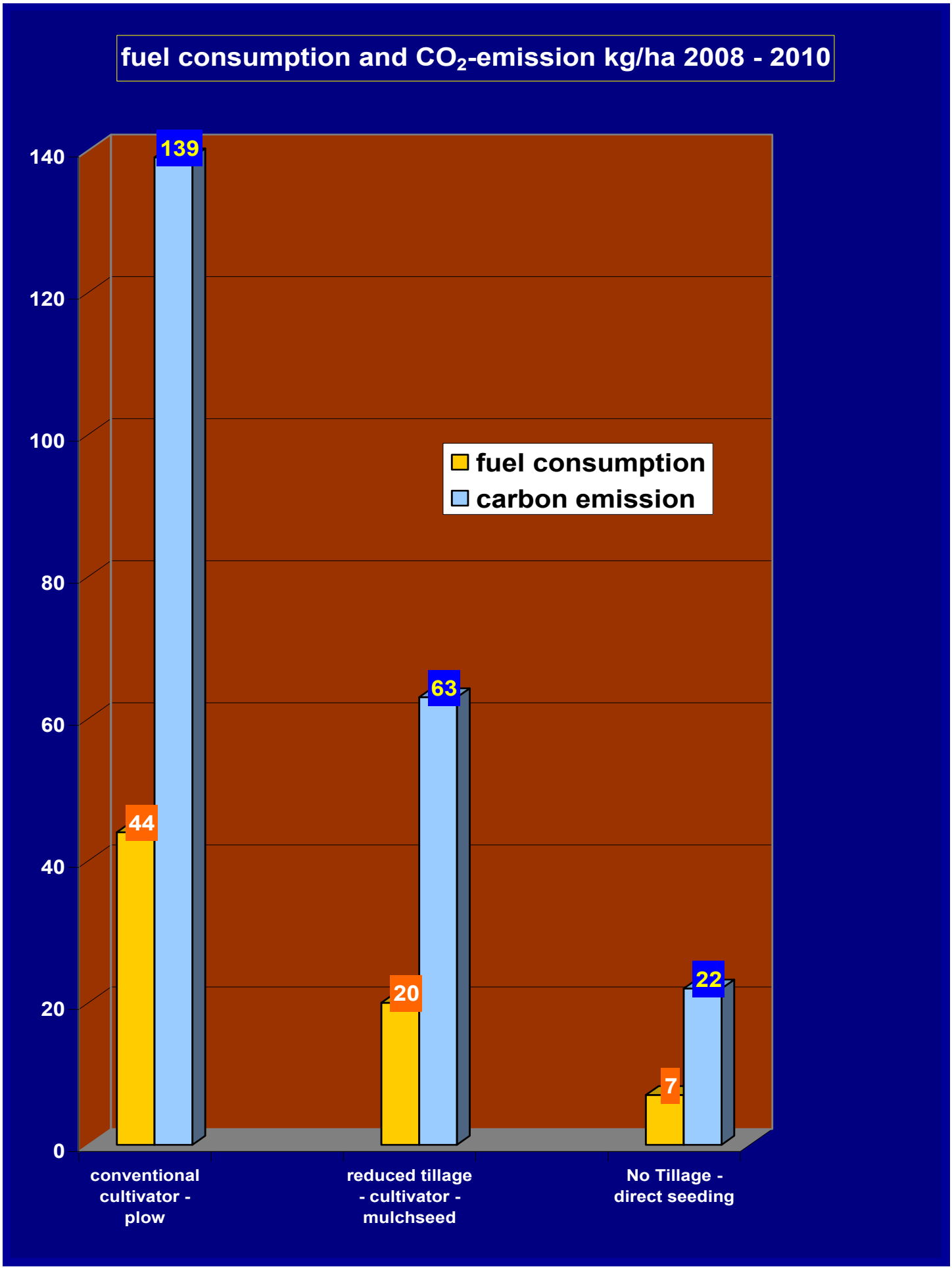
Aggregate stability (SAS) Pixendorf - Tullnerfeld

Better load carrying capacity of the soil ⇒ less soil compaction with traffic, no plowpan ⇒ better water infiltration during storm events…….


No Tillage > 10 years
Conventional Tillage


Rut depth profile
No Tillage Converntional


Conventional Tillage
No Tillage


fuel consumption and CO_2-emission kg/ha 2008 - 2010
140
120
100
80
60
40
20
0
139
44
63
20
22
7
fuel consumption
carbon emission
conventional cultivator - plow
reduced tillage - cultivator - mulchseed
No Tillage - direct seeding

Conclusion

•Mulch –and direct –seeding systems are fully developed and and go well in practice.

•The economical benefits and the nutrient – pesticide and soil movement (erosion) reduction in the minimum tillage systems are significant.

•Cereal – maize crop rotation needs a shallow mulch of crop residuals for a fast decomposition as a phytosanitary need.

•The production of Mycotoxins by Fusarium disease (Dry Rot) is to be interrupted by shallow soil tillage and an adopted crop rotation.

•After harvest the growth of volunteer cereals has to be interrupted, they stand for a green bridge for plant diseases like barley yellow dwarf virus or Fusarium sp. and pests like aphids as a vector for the virus.

•An immediat seeding of cover crops after harvest for a good development of the green manure is adviced.

•A reduction of the costs is possible and necessary.

•A prescription is not possible and depends from the crop rotation and natural situation.

Thank you for your attention

Results:

www.landimpulse.at/agroinnovation/downloads

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