

# Regional adaptation of soybean production in Germany



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**Workshop on 'Plant Proteins – Agronomic practices and environmental benefits', Bucharest, 12.06.2018**

# What makes soybeans so interesting?



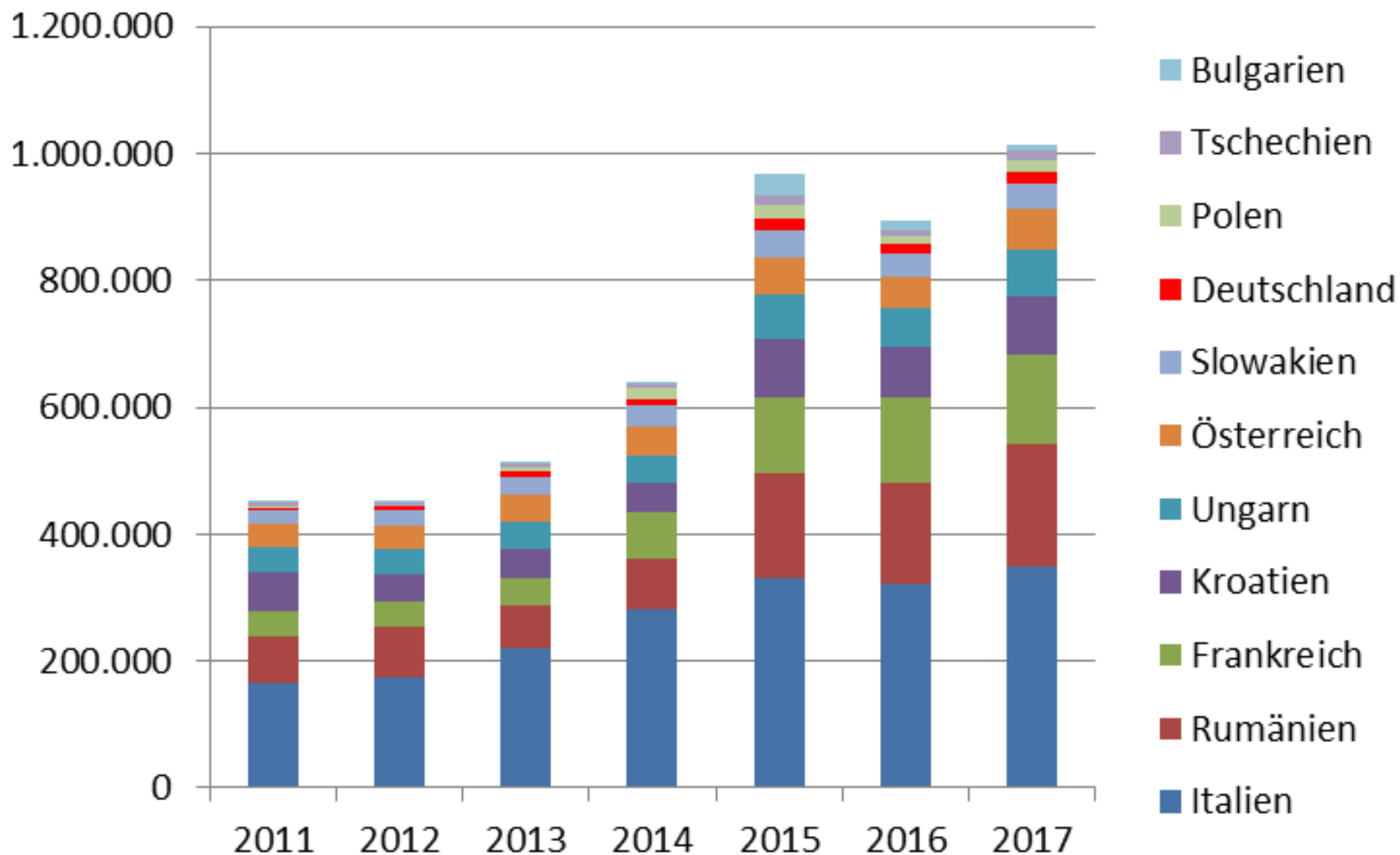
## Product-quality and –yield:

- Protein content (Concentration) + Oil
  - Protein quality (top of vegetable)
  - Protein yield (often highest/ha)
- often better than peas, faba beans and lupins

## Frugal about fertilizers and plant protection:

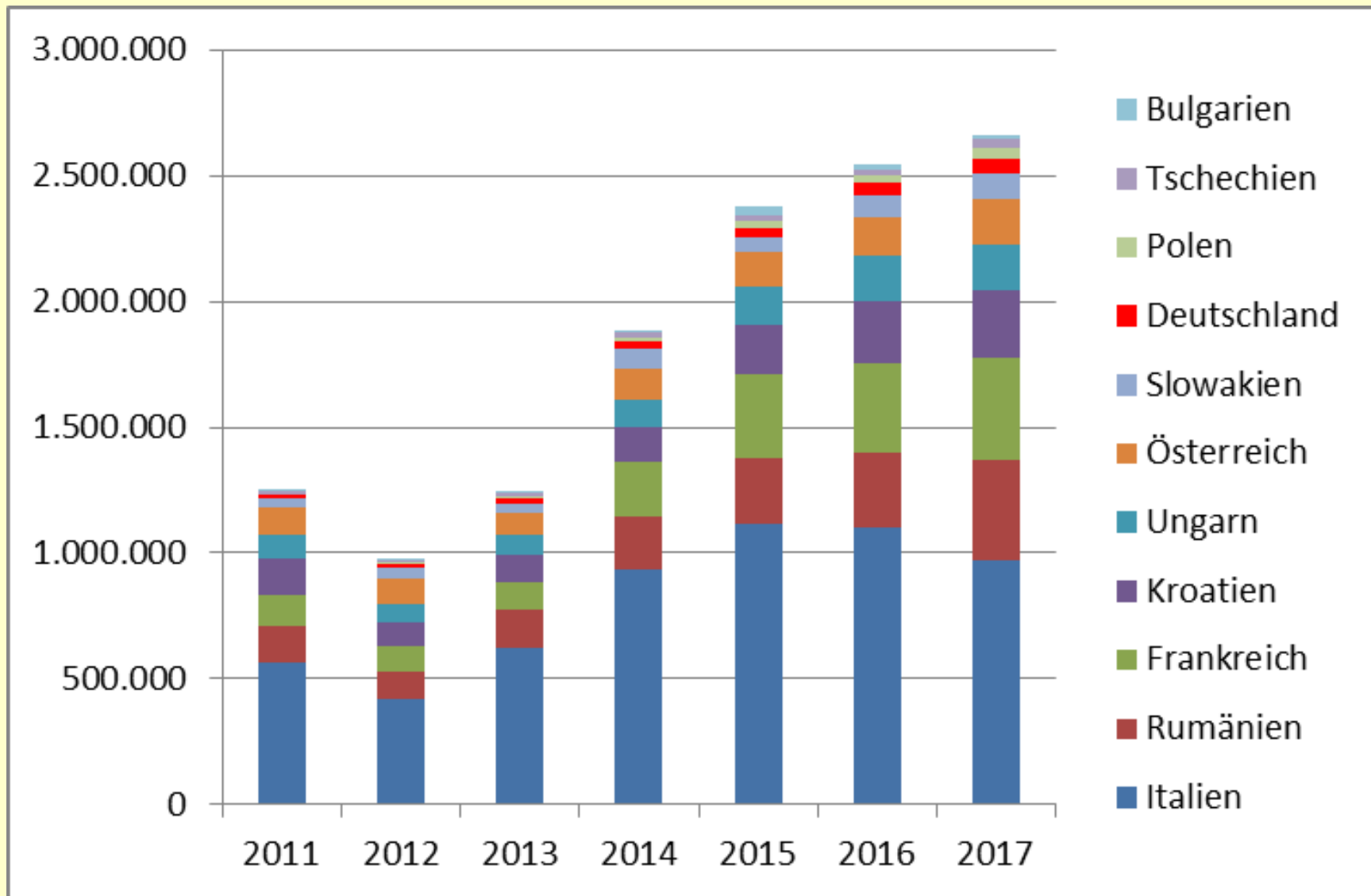
- No nitrogen input (→ nodules fix 200-300kg N)
- No direct P-K-fertilization necessary
- Not much pesticide (few infections and pests)
- Enrichment of cereal-rotations.
- Quite resistant against climatic stress

# Cultivation Area of Soybeans (ha) in EU 2011-2017



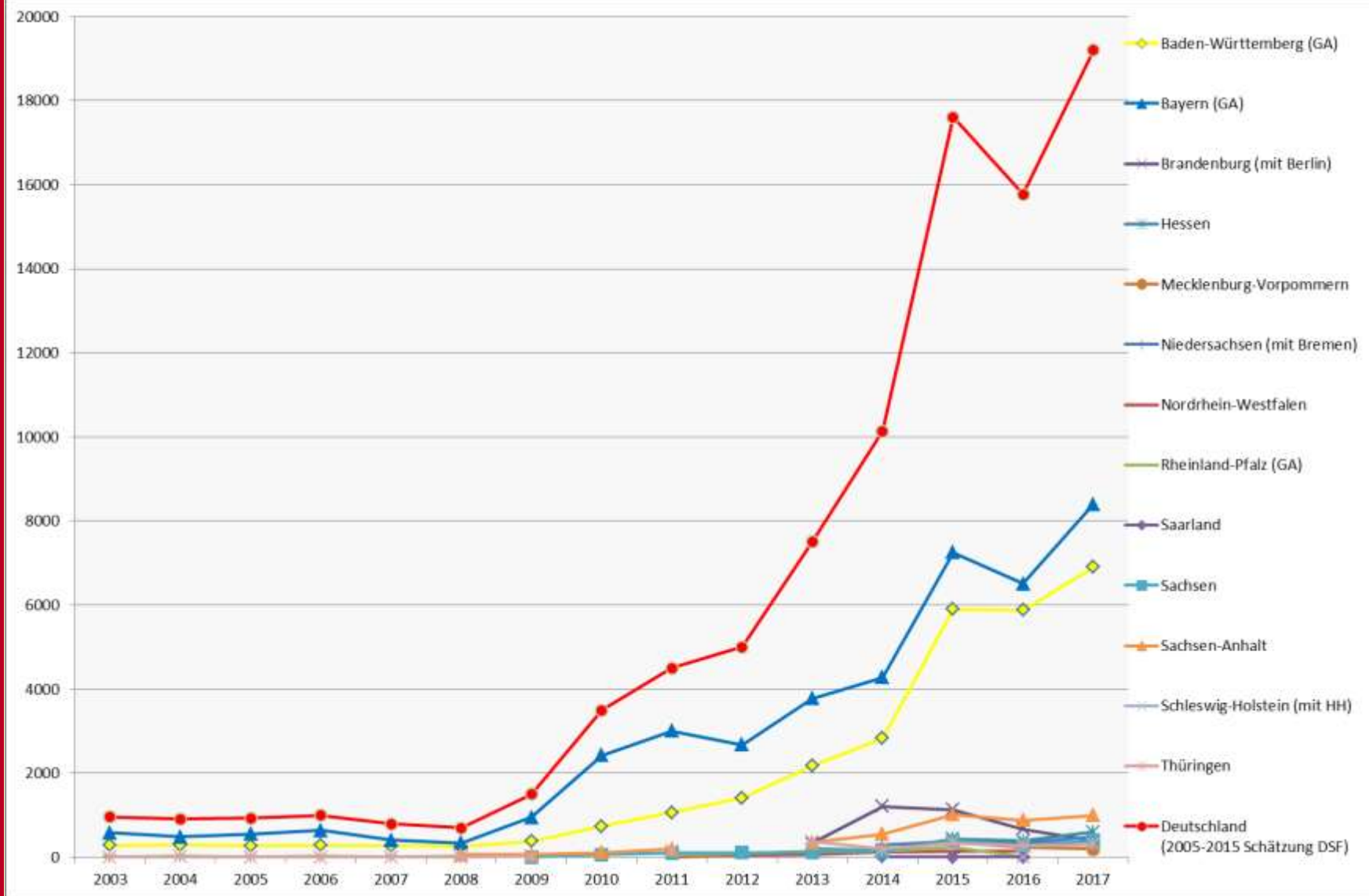
→ Greening

# Production of Soybeans (t) in EU 2011-2017



# Cultivation Area of Soybeans (ha)

## Germany 2003-2017



→ Greening



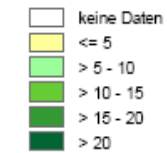


# Soybean area Baden-Württemberg 2009-2016

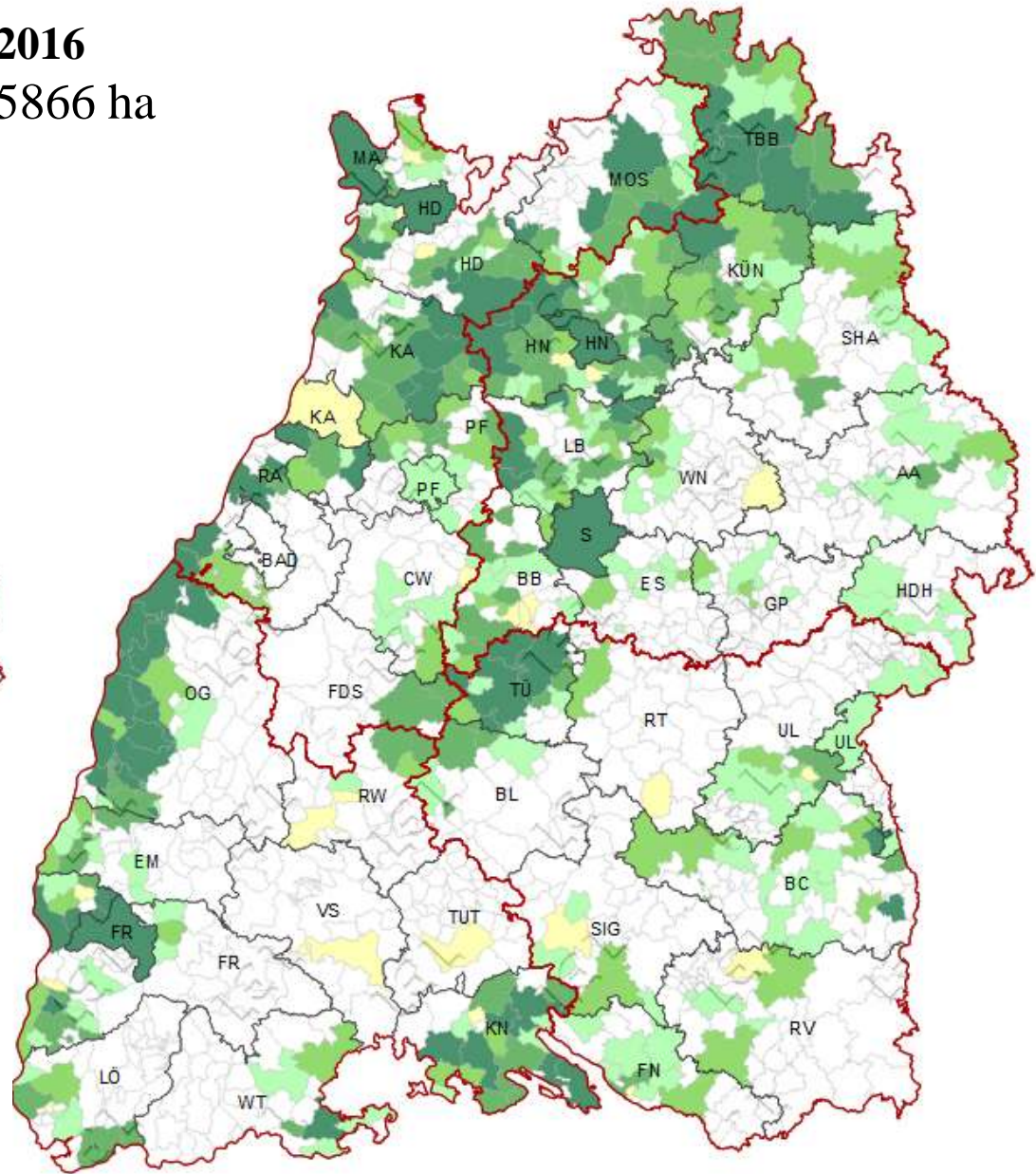
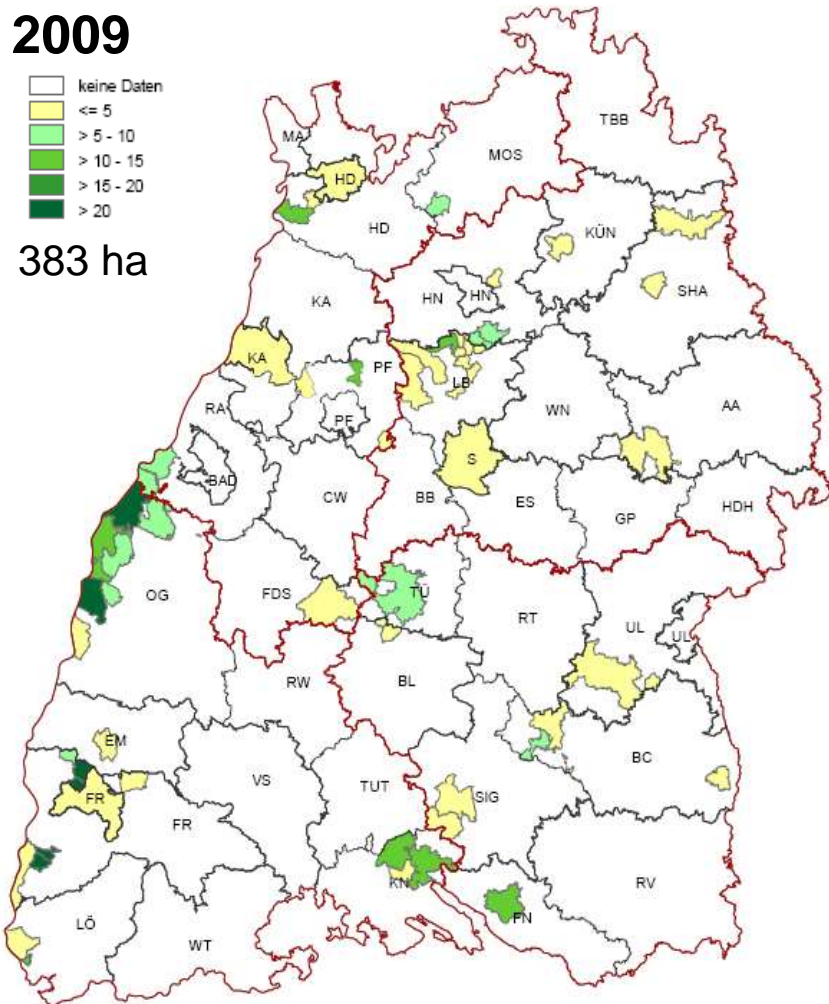
Baden-Württemberg

2016  
5866 ha

2009



383 ha

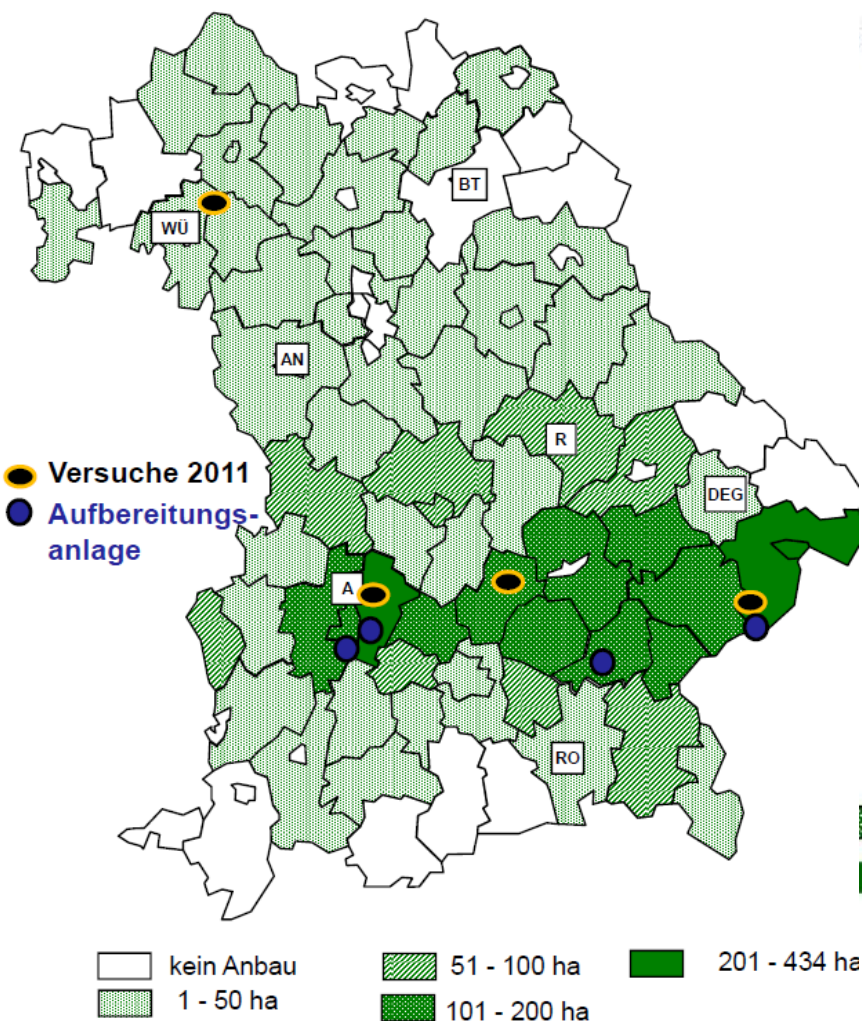




# Distribution of soybean area in Bavaria 2011–2015

Anbau von Sojabohnen in den Landkreisen Bayerns

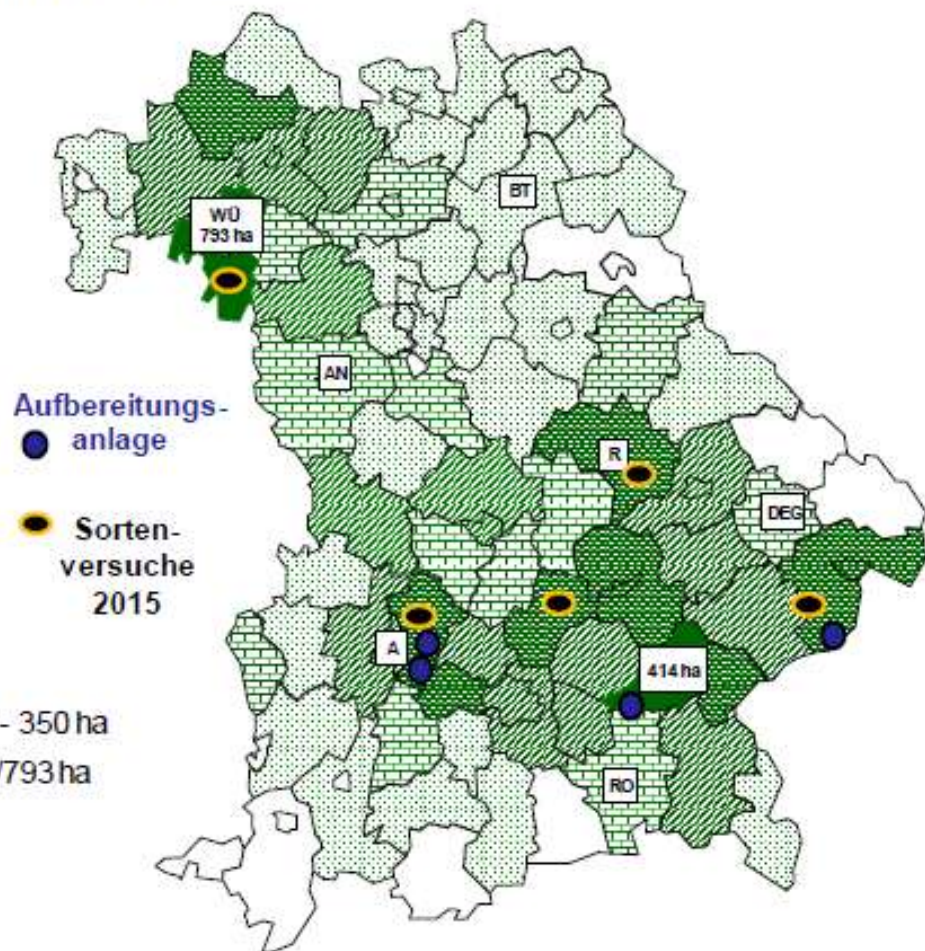
Gesamtfläche 2011: 3002 ha



Sojabohnen in den Landkreisen Bayerns 2015

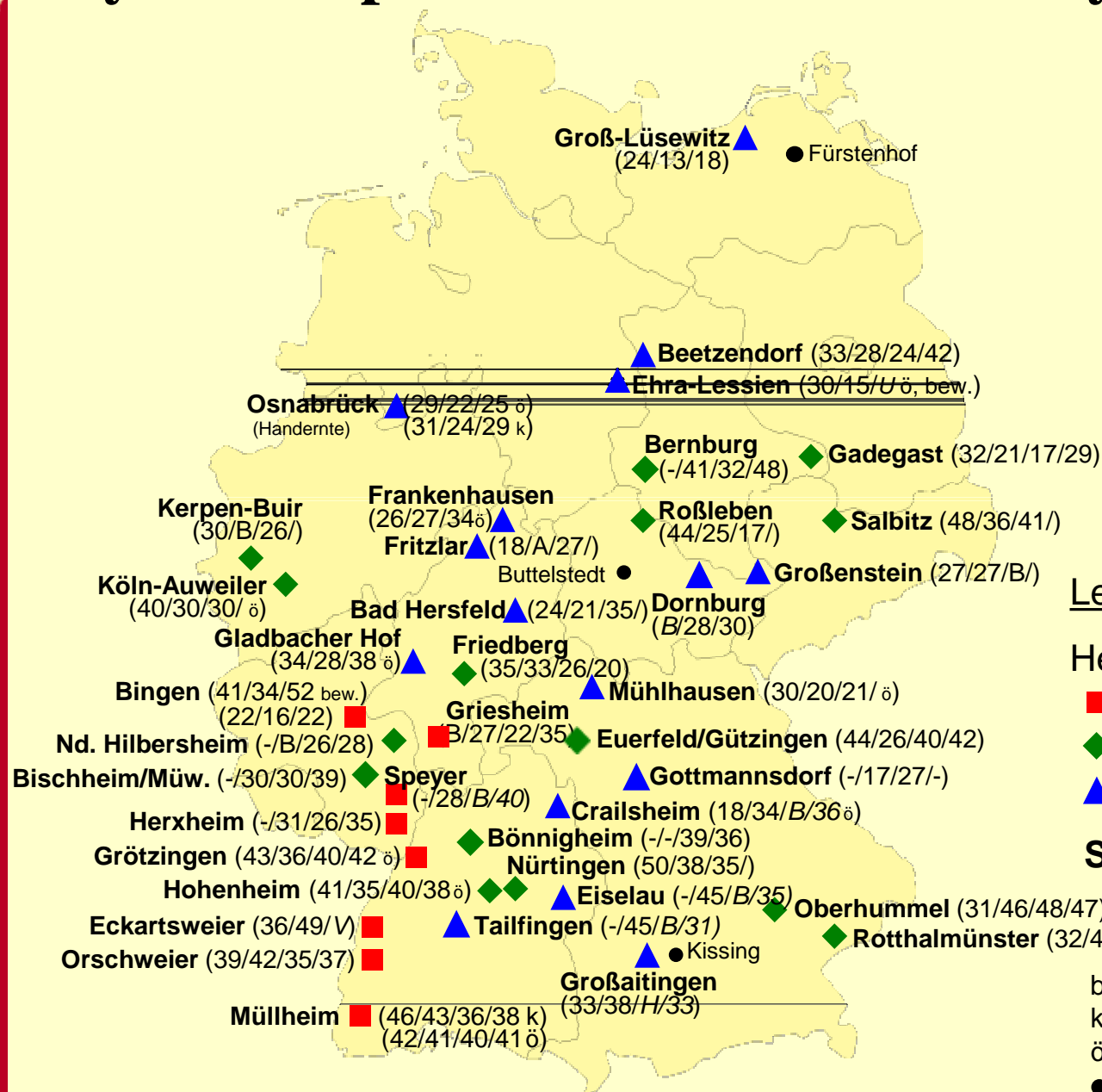
Gesamtfläche: 7 276 ha

Ernte 2015



Quelle: INVEKOS – Angaben 2011

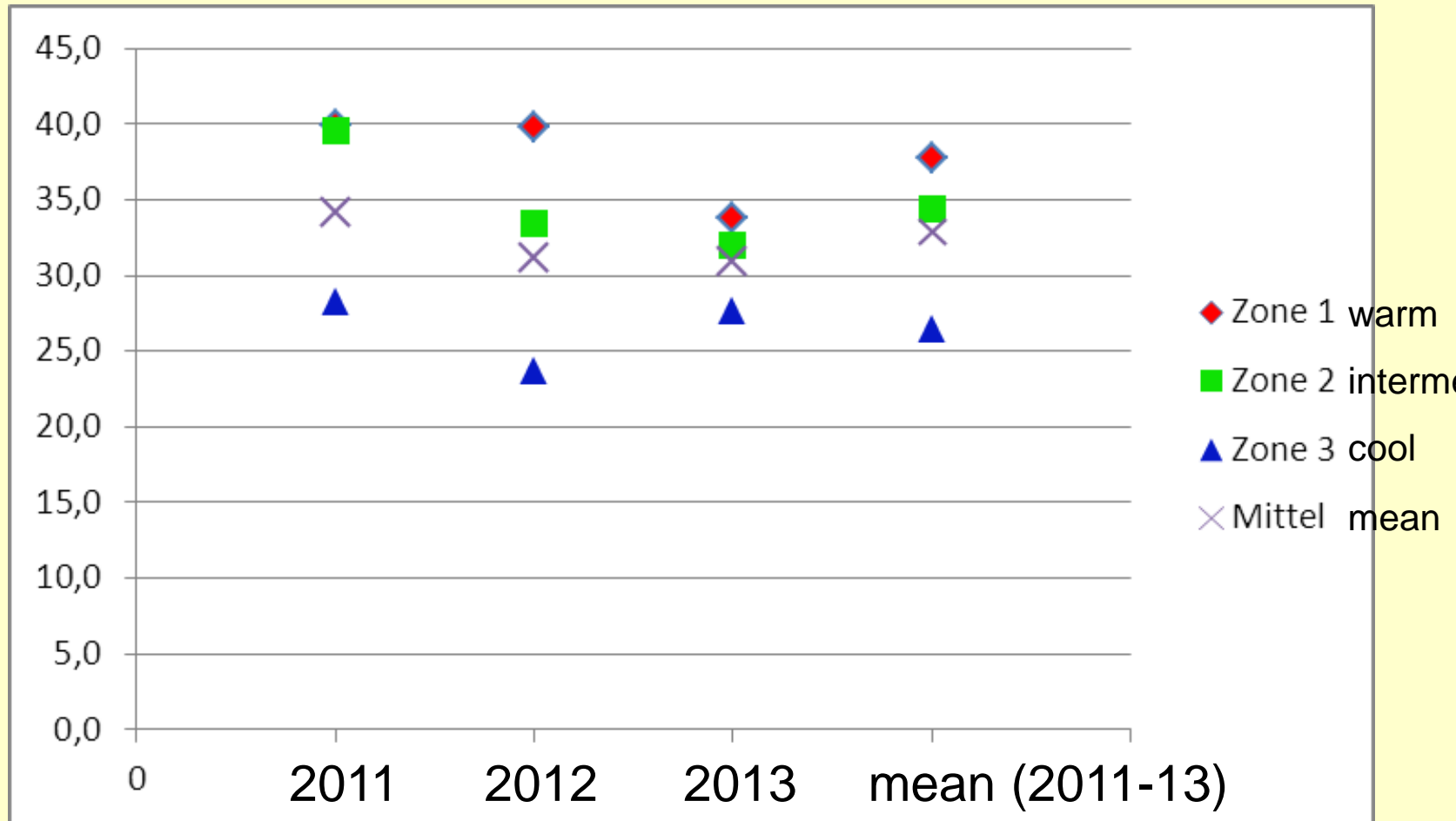
# Soybean-experimentation in Germany 2011/12/13/14





# Soybean yields (dt/ha) - Germany

(mean of 35 experimentation-sites 2011-2013)

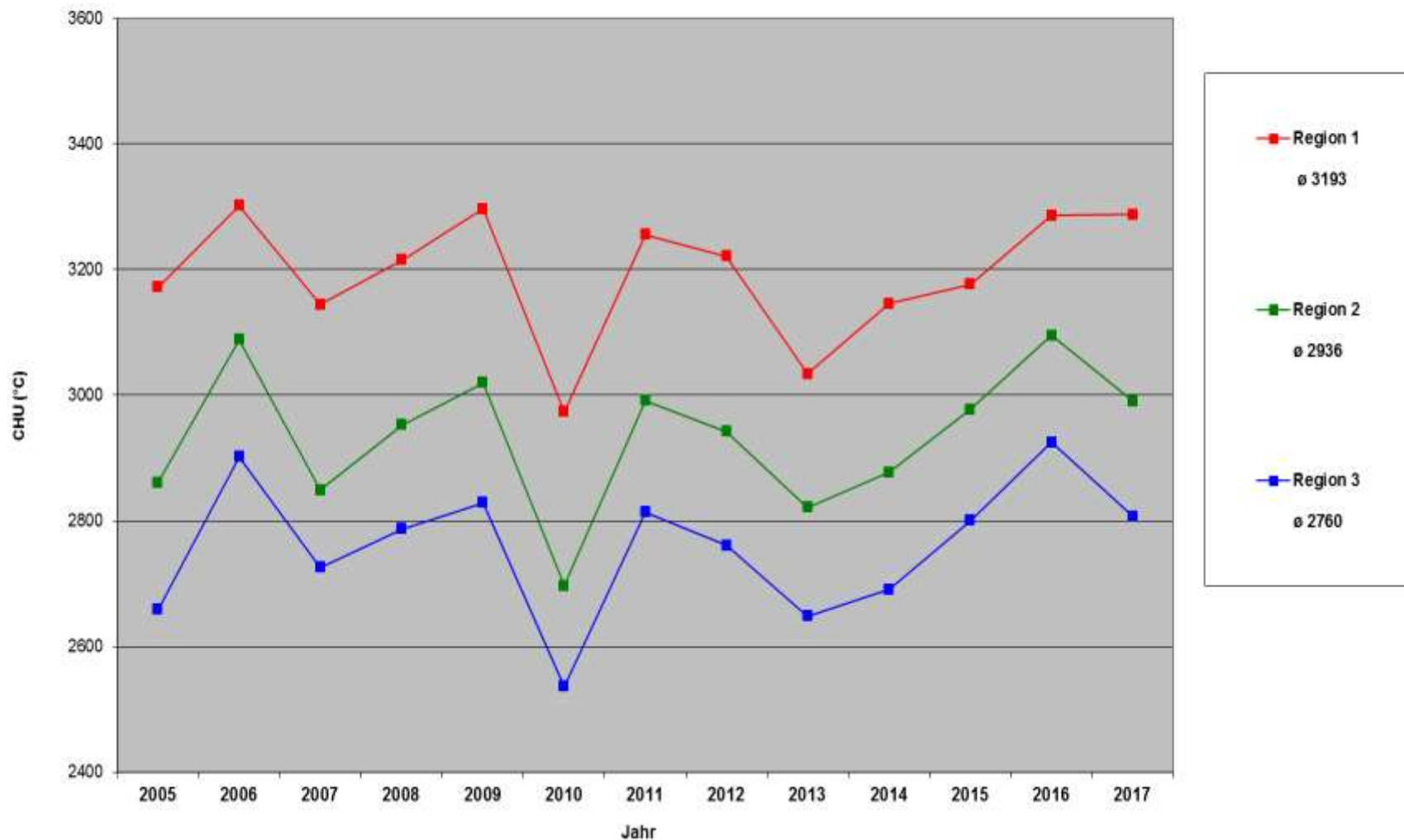




# CHU-heat sums, Germany

## May, 1<sup>st</sup> – September, 30<sup>th</sup> 2005-2017

Crop Heat Units (Soja) im Zeitraum 01.05.-30.09. in den Jahren 2005 - 2017





# Soy variety tests – Bavaria 2017

Grain yield and H<sub>2</sub>O-cont. on ordinary and better suitable sites for soybeans 2017

Grain yield ordinary sites (86% DM) H <sub>2</sub> O-cont.								Grain yield on better sites (86% DM) H <sub>2</sub> O-cont.									
frühe Sorten		Nieder- Groß- hummel aitingen		Mittel frühe Sorten		Nieder- Groß- hummel aitingen		spätere Sorten		Köfer- Wolks- Rotthal- ing hausenmünster			Mittel spätere Sorten		Köfer- Wolks- Rotthal- ing hausenmünster		
		FS	A			absolut	relativ			FS	A	R			WÜ	PA	absolut
Saat/Ernte	am:	13. 4.	11. 5.			27.9.	28.9.	Saat/Ernte	am:	9. 5.	6. 4.	4.5.			5.10.	16.10.	27.9.
ES Mentor	00	111	111	51,2	111	18,5	21,8	Silvia	00	118	117	129	57,8	121	23,5	15,8	22,8
SY Eliot	000/00	111	110	51,1	111	17,0	17,8	ES Mentor	00	110	104	120	53,0	111	19,3	16,0	15,8
Galice	000	107	107	49,6	107	17,8	18,6	RGT Stump	00	112	106	110	52,0	109	19,3	16,5	16,4
Comandor	000	101	110	48,7	106	19,4	16,8	SY Livius	000	102	106	104	49,8	104	18,4	15,6	19,4
SY Livius	000	103	106	48,3	105	17,7	18,0	SY Eliot	000	110	113	87	49,7	104	18,9	15,4	19,7
Amadea	000	102	104	47,6	103	17,8	18,2	Bettina	00	99	107	95	48,1	101	19,4	16,5	18,6
Amarok	000	101	102	47,0	102	17,1	16,3	Solena	000/00	93	101	107	47,9	100	19,2	16,6	15,7
Coraline	000	101	99	46,3	100	20,5	20,7	Regina	000	96	93	112	47,7	100	18,8	16,2	15,6
Regina	000	100	97	45,4	98	17,3	16,9	Lenka	00	101	102	93	47,2	99	19,0	15,9	21,0
Alexa	000	97	99	45,2	98	17,1	16,3	Amarok	000	99	93	104	47,1	98	19,0	15,7	15,2
Obelix	000	95	100	45,0	97	16,6	17,0	Comandor	000	98	94	102	46,7	98	19,1	15,9	15,5
Merlin	000	100	94	45,0	97	17,7	16,7	RGT Svela	00	95	98	99	46,5	97	19,4	15,8	18,7
GL Melanie	000	94	97	44,0	95	17,2	16,7	RGT Shouna	000	92	100	99	46,4	97	19,9	15,9	19,4
RGT Shouna	000	94	93	43,2	94	19,0	22,5	Amadea	000	94	97	90	44,8	94	19,6	15,8	17,2
Toutatis	000	93	92	42,7	92	17,9	17,8	Soprana	00	98	94	88	44,6	93	19,3	15,6	23,9
Sultana	000	90	77	38,8	84	16,7	18,7	Merlin	000	89	85	90	41,9	88	19,5	15,6	15,0
Lissabon	000	95	91	74	41,4	87	18,2	15,3	15,7								
Mittel dt/ha		49,8	42,6	46,2						45,3	53,6	44,5	47,8				

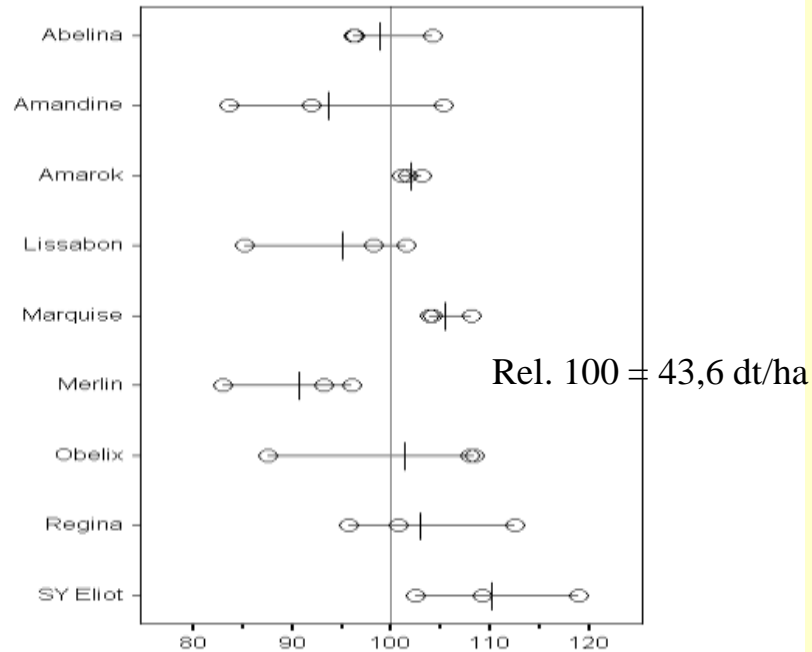




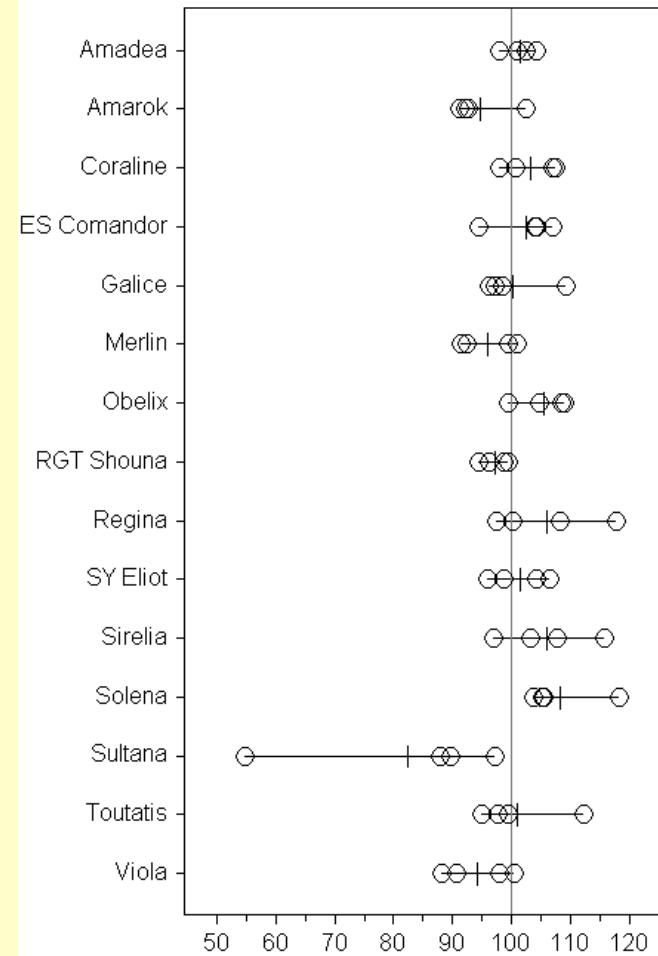
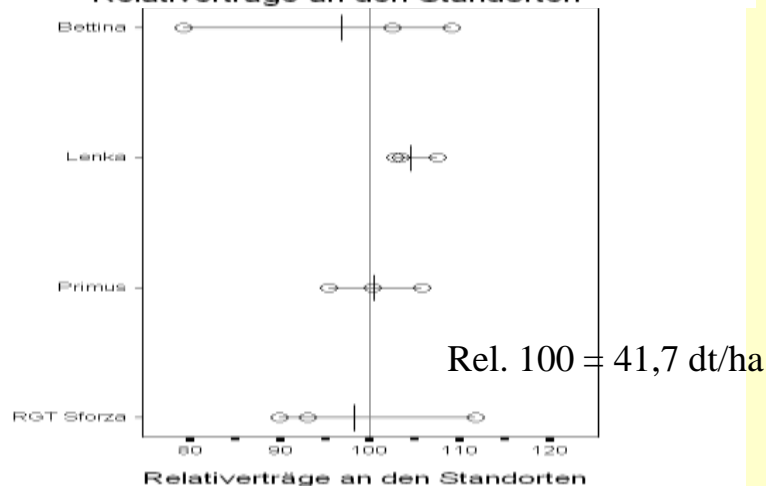
# Streugrafik LSV Soja B-W 2017

öko (B-W)

konv. (B-W)



Relativerträge an den Standorten



Relativerträge an den Standorten

Rel. 100 = 45,2 dt/ha



# Soybean yields in Germany

- Are more reliable than those of
  - other grain legumes
  - than corn (without irrigation)
- Are concurrential to non-GMO world market production (even without special subsidies)
- Contribute to balance meteorological risks within Europe (Western-/Middle-/Eastern)
- Are satisfying market demand for regionally produced food without GMO
- Seed multiplication in Germany reduces the risks of multiplication within Europe



# Site quality for Soybean cultivation: factors

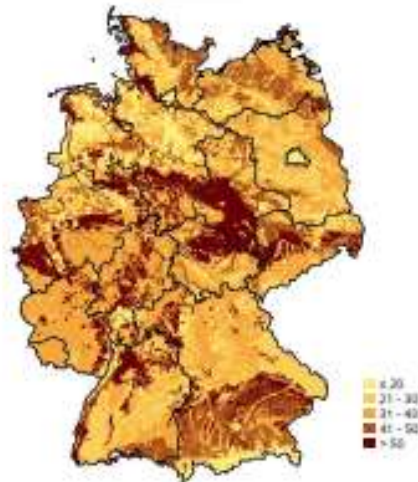
Soil quality

WATER

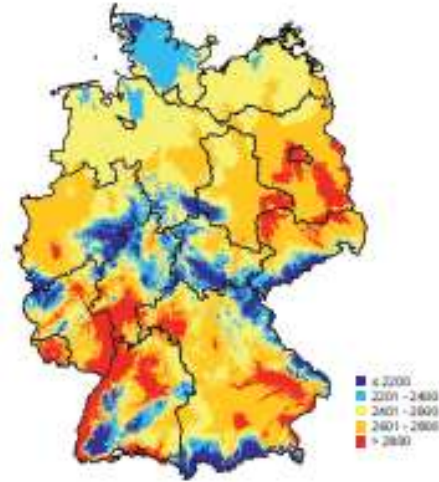
Rainfall  
Jun-Aug

## Anbaueignung Sojabohne - Basisdaten

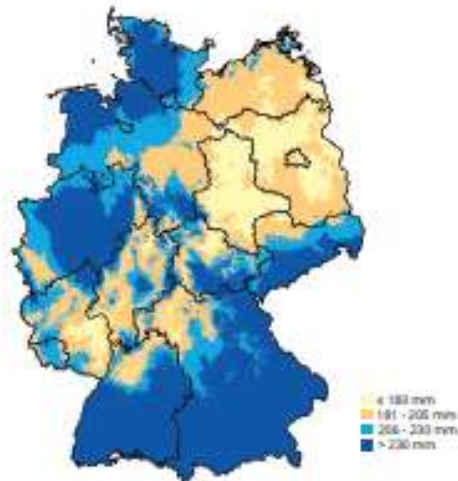
Bodenwertzahlen



Temperatursumme nach CHU, modifiziert



Niederschlagssumme vom 01.06. - 31.08.



Globalstrahlung vom 01.06. - 30.09.



Heat sums  
(CHU)

May-Sep

Mean 1981-2009  
from 1218 stations

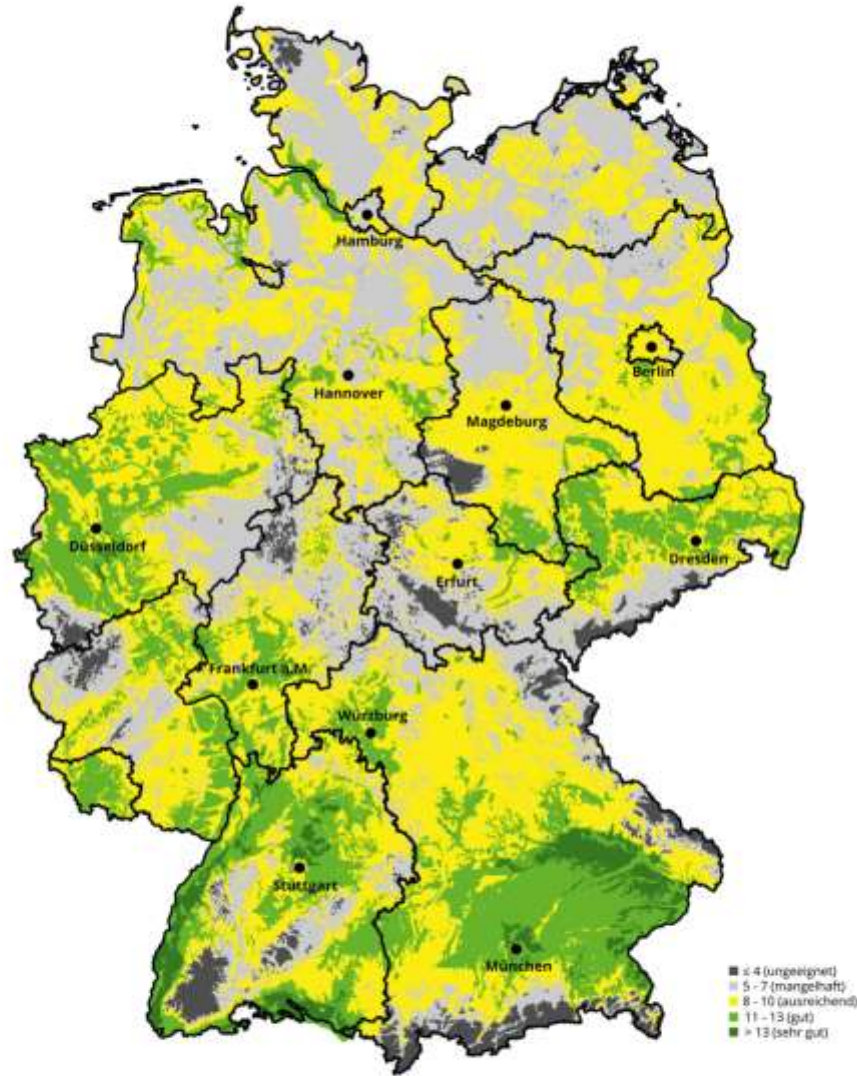
HEAT

Global  
Radiation  
Jun-Sep

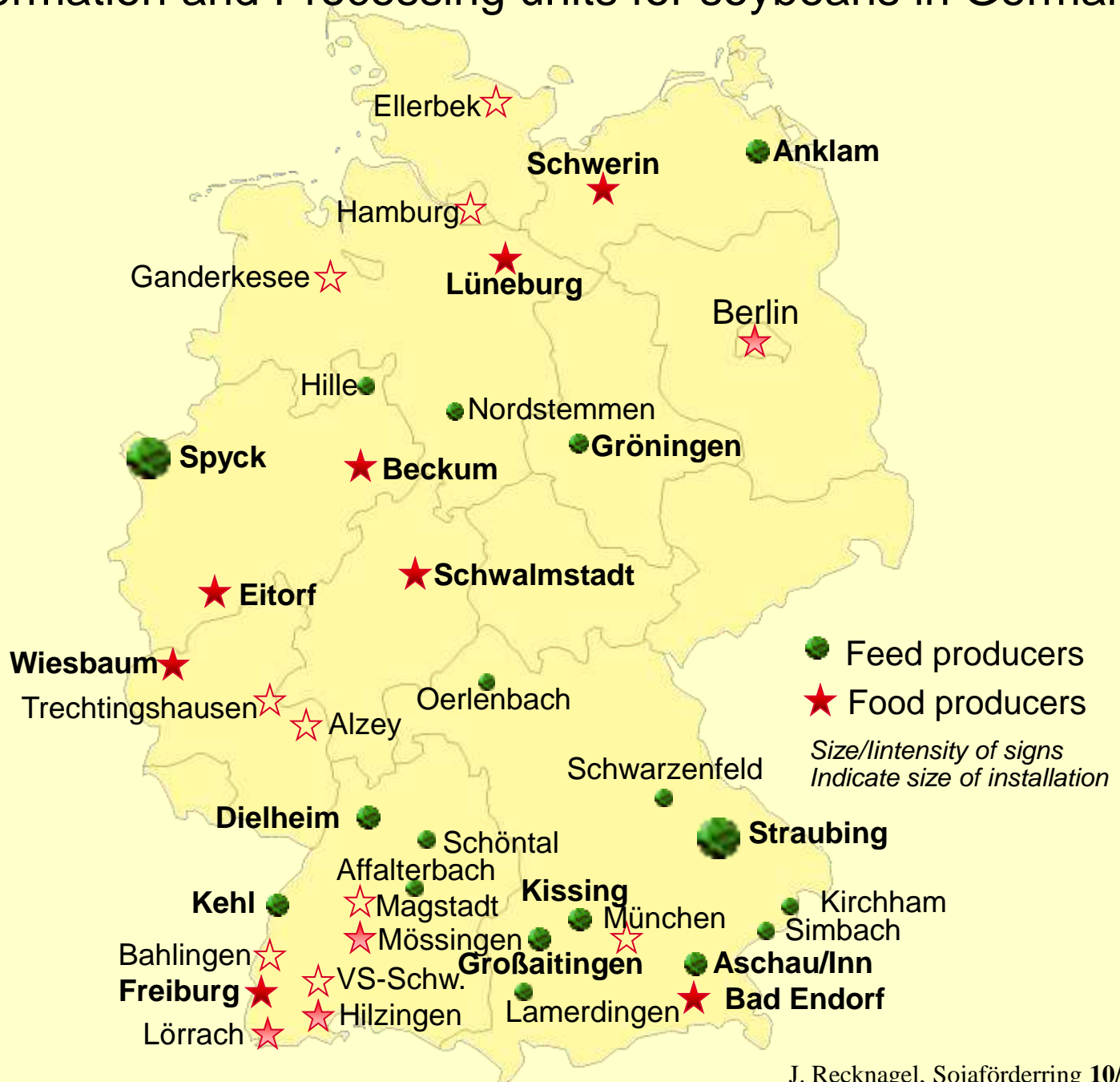


# Overall suitability for soy cultivation (warmth+irradiation x water x soil)

## Anbaueignung Sojabohne



# Transformation and Processing units for soybeans in Germany



# Processing/Transformation of Soybeans in Germany

- There are quite some transformers of soybeans (food) in Germany, but only few of them buy directly from farmers.
- During the last 10 years have been installed more and more small and medium size processing units for heat treatment of soybeans in southern Germany (some with oil pressing facilities) for feeding poultry and pigs with local feed (→ regional marketing)
- Since 2017 big oil-extraction factories of ADM along the Danube and Rhine-river have been converted to process GMO-free soybeans from Europe  
→ New dimension + new, until now non existing quality  
(HP meal without oil)



# What are the challenges of soybean cultivation?

Requirements to warmth and water

- climate
  - soil
- (irrigation)

Requirements for cultivation and use

- Seed
- Weeding
- Harvest
- Utilisation

# Soy-Network: Pilot farms 2015

Objectives:

Know how transfer

Data mining

Value chain development

120 farms: **50 pilot farms**  
and 70 demonstration farms  
in 11 regions of Germany  
46% conv. / 54% organic

Project partners:

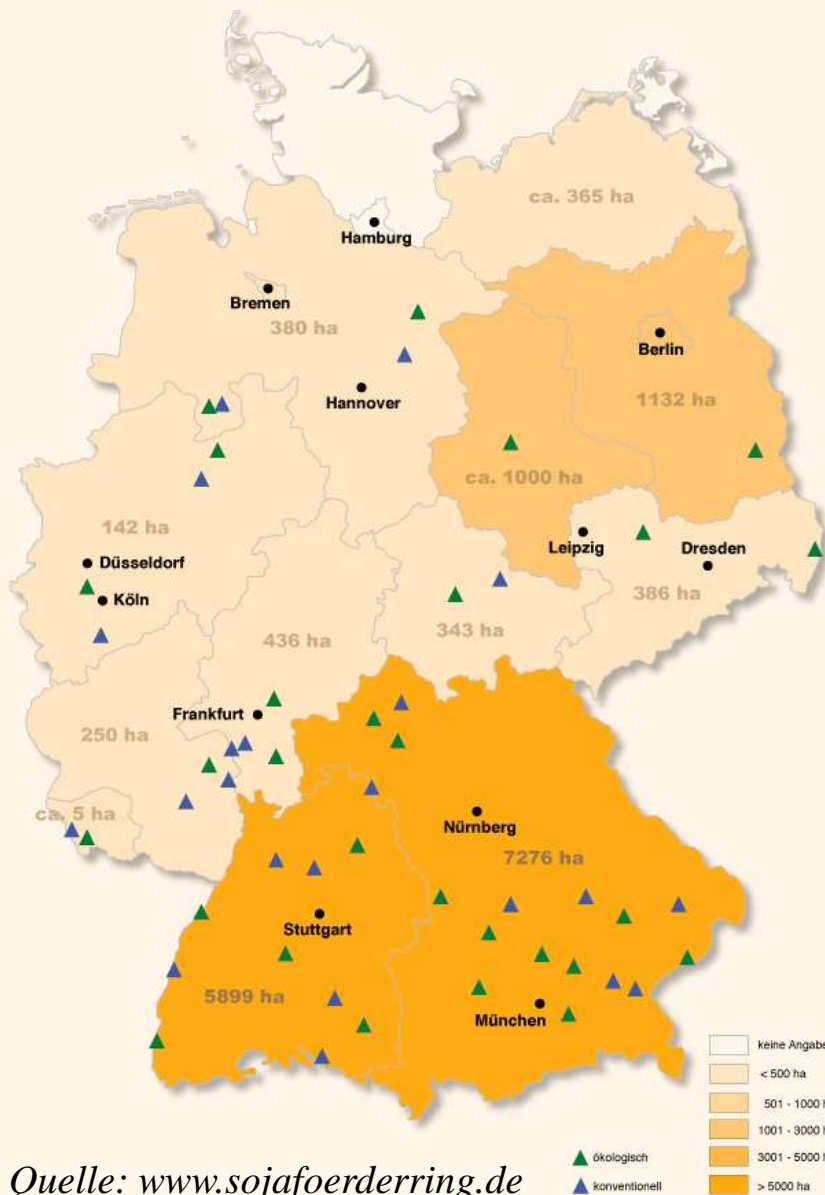
Bavaria: LfL, LVÖ

Bad.-Württ.: LTZ, Taifun  
+ 11 more

Financing:

BLE in the framework of  
German protein plant strategy

01.09.2013 – 31.12.2018



# Advice about soybean varieties (in: Integrierte Pflanzenproduktion B-W 2016)

**TABELLE 37: SOJABOHNEN**

Sorte	zugelassen seit ....	Nabelfarbe	Reife (1=früh)	Jugendentwicklung (1=sehr gut)	Standfestigkeit (1=sehr gut)	Tausendkorn- masse (1=sehr hoch)	Rohproteingehalt	Rel.-Kornertag LSV 2011 bis 2015	Rel.-Proteinertag LSV 2011 bis 2015	Besondere Hinweise
<b>Reifegruppe 000 (sehr früh)</b>								<b>31,7</b>	<b>11,04</b>	<b>dt/ha=100%</b>
Amandine	2012	h	3	3	5	5	m	96,0	96,3	für Lebensmittel-Vertragsanbau
Lissabon	2008	h	3	4	3	4	m	97,9	95,2	bewährte, ertragsstabile Sorte
Merlin	1997	d	2	2	5	7	m	92,5	90,0	robust, für kühlere Lagen
Obelix	2014	m	2	1	3	1	n	91,8	92,3	sehr gute Jugendentwicklung und frühe Reife
Sultana	2009	d	3	4	3	3	h	100,3	102,4	nicht für trockenere Lagen
<b>Reifegruppe 000/00 (sehr früh bis früh)</b>								<b>31,7</b>	<b>11,04</b>	<b>dt/ha=100%</b>
Herta PZO	2013	h	4	3	5	3	sh	94,3	104,3	sehr hohe Proteingehalte
SY Livius	2013	h	4	4	3	3	m	105,5	106,2	für feuchtere Lagen
Pollux	2012	h	4	4	6	5	n	105,8	106,0	für trockenere Lagen
RGT Shouna	2015	d	4	3	5	5	h	102,8	105,3	
Solena	2012	d	4	3	5	3	m	102,5	105,0	für trockene Lagen
<b>Reifegruppe 00 (früh; für Rheintal und Weinbauklima)</b>								<b>31,7</b>	<b>11,04</b>	<b>dt/ha=100%</b>
Korus	2011	h	5	4	2	4	sh	102,7	113,4	Tofu-Sorte bei guter Wasserversorgung
SY Eliot	2013	h	5	4	4	2	m	109,4	107,8	ertragsstabile Sorte
Primus	2006	h	5	4	3	1	sh	98,1	107,3	Tofu-Sorte bei knapperer Wasserversorgung
ES Mentor	2010	h	7	5	2	3	h	112,0	116,7	nicht für trockene Lagen, empfindlich gegen Metribuzin
Silvia PZO	2012	d	8	3	5	4	n	113,4	106,3	nur wärmste, trockene Standorte

<sup>1</sup> Quelle: Beschreibende Sortenliste Österreich 2015, geändert

**Reife:** 1=sehr früh...8=sehr spät; **Nabelfarbe:** h=hell; d=dunkel; m=mittel; **Rohproteingehalt:** n=niedrig; m=mittel; h=hoch; sh=sehr hoch; **Rel.-Ertäge:** Ackerbaugebiet Südwest; Versuchsstandorte: Orschweier, Müllheim, Bönningheim, Eiselau Tailfingen (alle BW); Fritzlar (HE); Griesheim, Nieder-Hilbersheim, Herxheim, Biedesheim (alle RP)



# Weed control → herbicides

## ■ Pre emergence treatment is essential!

- **Sencor WG / Artist:** Chenopodium + Atriplex  
(Metribuzin 700 g/kg / Metribuzin 175 g/kg + Flufenacet 240 g/kg)
- **Stomp aqua** (Pendimethaline 455 g/l): may be not tolerated in case of infiltration after heavy rainfall! (especially in combination with Sencor)
- **Spectrum:** Panics, Amaranth, Solanum nigr.  
(Dimethenamid-P 720g/l)
- **Centium CS:** Cleavers, Polygonaceous plants  
(Clomazone 360 g/l)

## ■ Post emergence only for correction

- **Harmony** (Thifensulfuron 480,6 g/kg), ... Dicots
- **Clearfield Clentiga** (Imazamox 12,5 g/l + Quinmerac 250 g/l): Dicots
- **Fusilade MAXX** (Fluzifop-P), **Focus ultra** (Cycloxidim): Panics



# Weed Control: pre-emergence

- 1,5 – 2 kg/ha Artist (Metribuzin 175 g/kg + Flufenacet 240 g/kg)  
+ 0,2 – 0,25 l/ha Centium 36 CS (Clomazone 360 g/l)
- 0,3 – 0,4 kg/ha Sencor WG (Metribuzin 700 g/kg)  
+ 0,6 – 0,8 l/ha Spectrum (Dimethenamid-P 720g/l)  
+ 0,25 l/ha Centium 36 CS (Clomazone 360 g/l)  
(+ 0,4 l/ha Herbosol for better tolerance)
- dose has to be adapted in order of clay- and humus-content of the soil!



# Harvest





# For a harvest without problems...

- Maturity must be verified regularly from start of leave-fall beginning/mid of **September**
- Prepare harvest combine when beans make sound in pods whilst agitating
- **Harvest at 15-13% humidity**; in October may be at 20-25%
- Exploit sunny hours of early afternoon!  
→ Humidity can come down by 5% from morning to afternoon!
- Correct regulation of combine (**experienced driver**)!  
→ Cutting bar as low as possible above the ground – no ear-lifter!  
Rotational frequency down – open cage – much wind:  
→ no broken beans – no pods!
- Axial-combines with **flexible cutting bar** (and wind-reel) are best!







Home/Aktuell

Anbau

Nach der Ernte

Qualität

Markt

Forschung

Links & mehr

Veranstaltungen

Suche

## Aktuell

- **06.-07.12.17** Sojatagung 2017 von den Projekten Soja-Netzwerk und FixVorSaat Soja im Bildungshaus St. Bernhard in Rastatt, **Baden-Württemberg**. [Mehr](#)
- **Unterrichtskonzept „Soja – Vom Acker auf den Teller“** für Grundschulen erschienen
- **Wertschöpfungsketten bei Sojabohnen**
  - **Praxisleitfaden Bio-Soja – Qualität vom Feld bis zum Futtertrog**
  - **Tofusojabohnen: Dem Geheimnis erfolgreichen Vertragsanbaus auf der Spur – Hinweise für Landwirte und Verarbeiter**
- Sojaanbau für Tofu: Ein neues **Video** erklärt, worauf es ankommt.
- Aktuelle **Presseberichte** finden Sie [hier](#).

PRESSEMITTEILUNG

20.09.2017

## Sojaanbau in Deutschland rechnet sich



» ANBAU » DIVERSE ANBAURATGEBER » ALLE TAIFUN SOJAINFOS

## Alle Taifun Sojainfos auf einen Blick

Im Rahmen des Sojanetzwerks hat das Taifun Sojazentrum zahlreiche Schwerpunktthemen und Videos rund um die heimische Sojabohne veröffentlicht. Weitere Veröffentlichungen werden folgen. Die Schwerpunktthemen werden fortlaufend überarbeitet und aktualisiert.

### Videos

1. **Impfung von Sojasaatgut** 2. **Aussaat von (Bio-)Sojabohnen** 3. **Mechanische Beikrautregulierung in Soja** 4. **Soja richtig dreschen** 5. **Sojaanbau für Tofu**

### Schwerpunktthemen

Nr. 46, März 2017: **Saatgut-Impfung mit der Sprühpistole**

Nr. 33, April 2017: **Edamame: Sojabohnen frisch aus dem Garten**

Nr. 32, Februar 2017: **Marktübersicht Impfmittel für Soja**

Nr. 28, Oktober 2016: **Zwischenfrucht-Untersaaten in Soja**

Nr. 26, Februar 2017: **Bohnenmosaikvirus**





» ANBAU » DIVERSE ANBAURATGEBER » EXTERNE ANBAUINFOS

## Diverse Anbauratgeber

Anbauempfehlungen des Deutschen Sojafördering zum Download: **Umfassende Anleitung** und in **Stichworten**

**Sorten- und Pflanzenschutzinfos** des LTZ Augustenberg. Soja auf S.30/31.

Die französische **Terres Inovia** bietet auf ihrer Website umfassende, sehr aktuelle Informationen rund um den französischen (Bio-) Sojaanbau:

**Guide de culture soja bio 2017**

**Guide de culture soja 2017**

Umfassender, reich bebildeter **Anbauratgeber von Donausoja** mit detaillierter Krankheits- und Schädlingsbeschreibung.

Auf dem brandaktuellen Sojaportal der **Iowa Soybean Association** bekommt man einen guten Eindruck davon, was in den USA in Sachen Sojaanbau läuft.

Die Iowa State University hat bereits in den Sechzigern eine sehr brauchbare Beschreibung aller Entwicklungsstadien der Sojapflanze vorgelegt: **How a Soybean Plant Develops** (PDF, 9 MB)



# Cultivation potential (economically)

- Yield relation (Soy: Maize, Wheat, Rapeseed,...)  
considering crop rotation value as well as risk aspects  
(yield variation, cultivation success, meteorology, ...)
- Price relation (Soy: Maize, .....)
- Competition with specialized crops (vegetables),
- Incentives of Agricultural Policy (Greening, AEM, ...,  $\leftrightarrow$  farm biogas...)
- Commercialisation costs



# Cultivation Potential D – 1 empirical

- Arable surface: 11,900,000 ha (71% agri surf.)
- Corn for grain: ca. 500.000 ha (4,2% arable)
- Limit in rotation: 25 % (may be 33%)
- CAP-framework: Allowable for Greening-Obligations (Factor 1) when without pesticide use
- Eligible as a legume for AEM rotational measures in several regions
- **Economic viability** (world market; premiums for non-GMO and regional origin in value chains with higher prize levels)
- **Logistics** (Structures for stocking, processing,...)
- **Historic data:** Austria had soy on about 30% of grain maize area before entering EU
- **Translated to D** = ca. 150.000 ha Soy

# Cultivation Potential D – 2 discreet

- Discreet estimation: 25% of grain maize area: 125.000 ha (→ 330.000 t Soja)  
→ Soybean area could reach 7-fold the areal of 2015 (about 1% of arable area)
- ... under the condition of further development of interesting value chains for feed and food!



# Cultivation Potential D – 3 natural

According to the soy-suitability map there are in

<b>Suitability Cat.</b>	<b>Arable (ha)</b>	<b>Part in rotation (%)</b>	<b>Soy area (ha)</b>	<b>Yield (t/ha)</b>	<b>Production (t)</b>
Very good	343,000	20	68,000	3.2	220,000
Good	2,788,000	15	418,000	2.7	1,130,000
acceptable	6,000,000	5	300,000	2.5	750,000
<i>Total</i>	<i>9,131,000</i>	<i>8.6</i>	<i>786,000</i>	<i>2.67</i>	<i>2,100,000</i>

→ Soy could be cultivated on up to 30 times the surface of 2018  
In total that means 786.000 ha (6,6% arable) and 2.100.000 t prod.

- ... under the condition of further development of value chains for feed and food with interesting prices for soybean famers in an appropriate rhythms.

# Marketing potentials

- At a degree of 5% self-sufficiency in EU, principally no limits...
  - ... but big buyers want big lots + supply guaranty all year round, in order to start label-programs.
- need for bundling the production of small and medium size farmers....



# Conclusion

- Soya may be cultivated successfully also in northern regions of central Europe – like maize, .... if
- Know how – Transfer / counselling of farmers exists
- Development of value-adding chains is ensured
  - ... plus chances for developing SE-Europe
  - ... and contribution for maintaining a non-GMO cultivation in America (Brazil, Canada, ...)
- Growing offer of food items based on non-GMO-Soya from Europe (rsp. Brazil, ...)
- Finally it's the consumers' decision to buy food on a basis of European non-GMO soybeans → labelling



# Thank you for your attention !



[www.sojafoerderring.de](http://www.sojafoerderring.de)  
[www.1000gaerten.de](http://www.1000gaerten.de)