
SAATBAU
Saat gut, Ernte gut.

Bunt resistant varieties, breeding & variety development at Saatzucht Donau and Saatbau Linz, Austria

Christian Gladysz

Saatbau Linz eGen

- **Austrian cooperative founded 1950**

- **Members**

  3.180 farmers

- **Board of directors**

  12 members

- **Management board**

  16 members

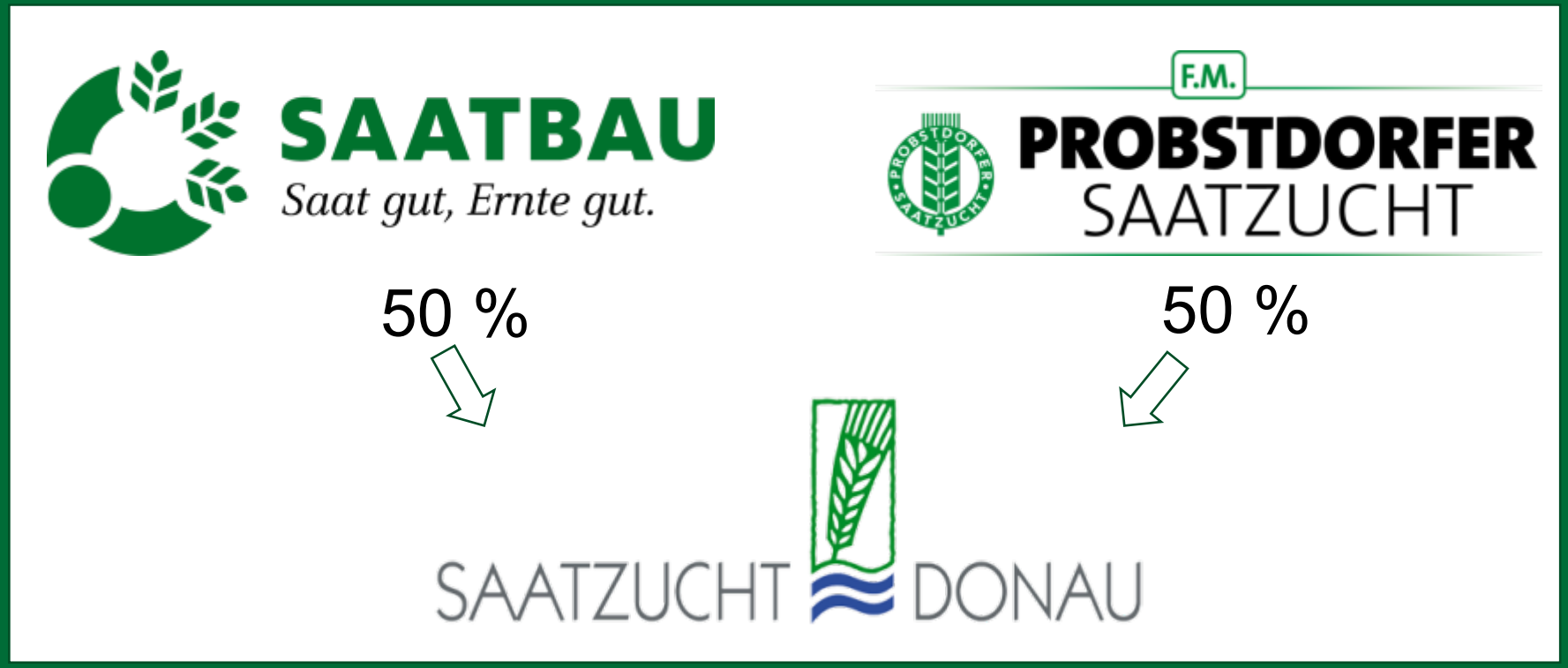
Employees

534 (299) Dec. 2020

Turn over

210 mio € Dec. 2020

Saatzucht Donau



Saatzucht Donau

- **Founded 01.07.2000**
- **2 Stations**

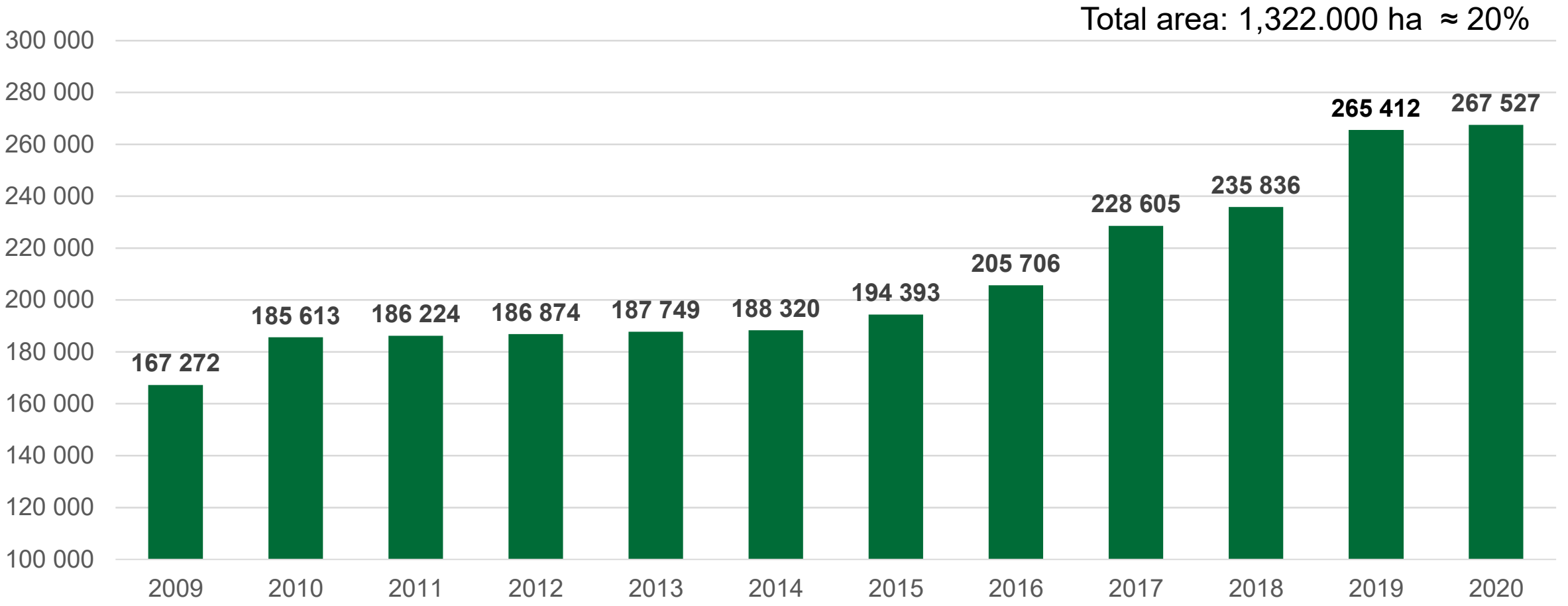
Probstdorf	**dry area**	**550mm / 9,2°C**
Reichersberg	**humid area**	**850mm / 7,8°C**

8 Breeding programs

- Probstdorf
  - winter wheat (high quality, organic)
  - winter barley 6r
  - winter, spring durum wheat
- Reichersberg
  - soybean
  - oilseed rape (OP)
  - winter malting barley 2r
  - winter triticale

Organic arable land in Austria

2009 – 2020 in ha: +64%



Quelle: BMLFUW (INVEKOS Betriebe)

Farm saved seed situation in Austria

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Saatgutabsatz und Saatgutwechsel in Österreich, Anbau 2018/2019, Ernte 2019

KONVETIONELL und BIO

Kulturarten	Fläche in ha	Absatz von Z-Saatgut in kg	Saatmenge in kg/ha bei	Fläche mit Z-Saatgut (ha) errechnet	Anteil Fläche mit Z-Saatgut	Saatgutbedarf in kg	Saatgut-wechsel
	A	B	C	D=B/C	E=D/Ax100	F=AxC	G=B/Fx100
Weizen							
Weichweizen	248.225	18.411.695	170	108.304	44%	42.198.250	44%
Dinkel	12.363	838.870	180	4.660	38%	2.225.354	38%
Durumweizen	16.703	1.270.020	160	7.938	48%	2.672.523	48%
Roggen	43.680	3.770.610	105	35.911	82%	4.586.400	82%
Gerste							
Wintergerste	101.567	11.059.570	145	76.273	75%	14.727.215	75%
Sommergerste	35.673	3.328.900	160	20.806	58%	5.707.680	58%
Hafer	20.597	1.921.335	140	13.724	67%	2.883.580	67%
Rispen-/ Sorghumhirse	10.067	161.440	17	9.496	94%	171.139	94%
Mais	307.158	7.751.235	25	310.049	100%	7.678.950	100%
Triticale	59.823	6.760.820	160	42.255	71%	9.571.680	71%
Winter-oo-Raps	35.895	135.740	5	27.148	76%	179.475	76%
Ölsonnenblumen	21.255	99.500	5	19.900	94%	106.275	94%
Sojabohnen	69.207	5.936.106	125	47.489	69%	8.650.833	69%

Auszug aus Daten und Zahlen der österreichischen Saatgutwirtschaft 2019

Common bunt in seed production

Seed certification in winter wheat 2016 – 2020 (BAES Austria)

		16/17	17/18	18/19	19/20	
prebasic / basic and C1 / C2	n	361	359	387	465	
	> 1	75,6	74,4	72,6	66,2	untreated seed accepted
	2 - 10	20,5	20	20,4	25,6	
	11 - 300	3,9	5,6	6,5	7,7	treatment obligatory
	> 300	0	0	0,5	0,5	depriviation for use as seed
	Max. incidence	131	285	893	370	

Auszug aus AGES/BAES - Institut für Saat- und Pflanzgut, Pflanzenschutzdienst und Bienen 2021

Loose smut in seed production

Seed certification in winter barley 2016 – 2020 (BAES Austria)

		16/17	17/18	18/19	19/20	
prebasic / basic	n	83	85	81	105	
	> 0,1*	84,3	88,2	86,4	53,3	untreated seed
	0,1 - 0,2	14,5	11,8	13,6	31,4	treatment obligatory
	0,3 - 0,8	1,2	0	0	11,4	
	< 0,8	0	0	0	3,8	depriviation for use as seed
	Max. incidence	0,5	0,2	0,2	1,5	
C 1 / C 2	N	58	64	66	149	
	> 0,1	75,9	75	66,6	28,9	untreated seed
	0,1 - 0,2	20,7	15,6	18,2	34,9	
	0,3 - 0,8	3,4	9,4	9,1	20,1	treatment obligatory
	0,9 - 2,0	0	0	6,1	7,4	
	2,1 – 5	0	0	0	6,7	
	< 5,0	0	0	0	2	depriviation for use as seed
	Max. incidence	0,8	0,8	1,4	9	

Auszug aus AGES/BAES - Institut für Saat- und Pflanzgut, Pflanzenschutzdienst und Bienen 2021

ad* % of tested kernels; 0,1% means 1 plant per 3 m²

Breeding for bunt resistance

in Saatzucht Donau

- By using donor varieties with bunt resistance
  - known donor varieties eg cv. Weston
  - resistance gene (mainly) known eg. *Bt10*
  - resistance monogenic
  - cv. Tillexus, Tillstop registered 2019 in Austria

- By coincidence with varieties carring bunt resistance (eg. Globus, Tommi, Tambor)
  - unknown resistance
  - cv. Tillsano registered 2020 in Austria

Bunt races in Austria

Different origins of bunt show different susceptibility of varieties

variety	CAPO	TILLEXUS	TILLIKO	TILLSANO
Resistance gene	-	*Bt10*	*BtZ*	unknown
origin of spores				
spore blend (used for VCU trials)	73	0	0	9
Loosdorf bei Mistelbach	76	29	5	7
Rohrau	78	64	31	8
Pamhagen	65	0	0	10
Kirchberg-Thening	85	73	44	5
Hinzenbach	85	53	22	7
Horn	62	2	2	3
Heldenberg	86	12	2	7
Schwarzenau	76	49	26	10
Sitzendorf an der Schmida	80	40	9	5

very high incidence
high incidence
medium incidence
low incidence

% bunt diseased ears

Landwirt 2019; Oberforster, Plank

ARMINIUS

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Organic winter wheat

ERTRAGSSTRUKTUR	**YIELD STRUCTURE**			
Kornertrag	grain yield	niedrig / low		hoch / high
Bestandesdichte	crop density	niedrig / low		hoch / high
Kornzahl/Ähre	kernel/head	niedrig / low		hoch / high
TKG	TGW	niedrig / low		hoch / high
AGRONOMIE	**AGRONOMY**			
Ährenschieben	heading	spät / late		früh / early
Gelbreife	maturity	spät / late		früh / early
Standfestigkeit	lodging resistance	gering / low		hoch / high
Wuchshöhe	plant height	kurz / short		hoch / high
Unkrautunterdrückung	weed supression	gering / low		hoch / high
Auswuchs	sprouting	hoch / high		gering / low
QUALITÄT	**QUALITY**			
Fallzahl	falling number	niedrig / low		hoch / high
Proteingehalt	protein content	niedrig / low		hoch / high
Hektolitergewicht	specific weight	niedrig / low		hoch / high
KRANKHEITSRESISTENZ	**DISEASE RESISTANCE**			
Septoria tritici	Septoria tritici	anfällig / susceptible		resistent / resistant
Echter Mehltau	powdery mildew	anfällig / susceptible		resistent / resistant
Gelbrost	yellow rust	anfällig / susceptible		resistent / resistant
Braunrost	brown rust	anfällig / susceptible		resistent / resistant
Ährenfusarium	fusarium head blight	anfällig / susceptible		resistent / resistant
Steinbrand	common bunt	anfällig / susceptible		resistent / resistant

TILLEXUS

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Organic winter wheat with bunt resistance

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Conclusio

From a breeders / seed companies view

- **Common bunt (Tilletia caries)**
  - Resistance breeding against bunt is realistic and feasible
  - Bunt resistance is not a stand-alone characteristic for successful variety development
  - Several (additive) options to get common bunt issues solved (breeding, sterilisation of seed, treatment…)
  - Soil borne bunt needs a long term restoration by avoiding host crops or resistant varieties
  - Use of certified organic seed helps to keep the disease under control.

Conclusio

From a breeders / seed companies view

- **Loose smut (Ustilago nuda)**
  - Much bigger problems to get smut under control (resistance ?, low treshholds in seed certification, no treatment for organic seed, etc.)
  - Significant rising incidences in all seed stages
  - Organic seed supply (smut free) cannot be insured in mid-term time axis of 5-10 years!!!