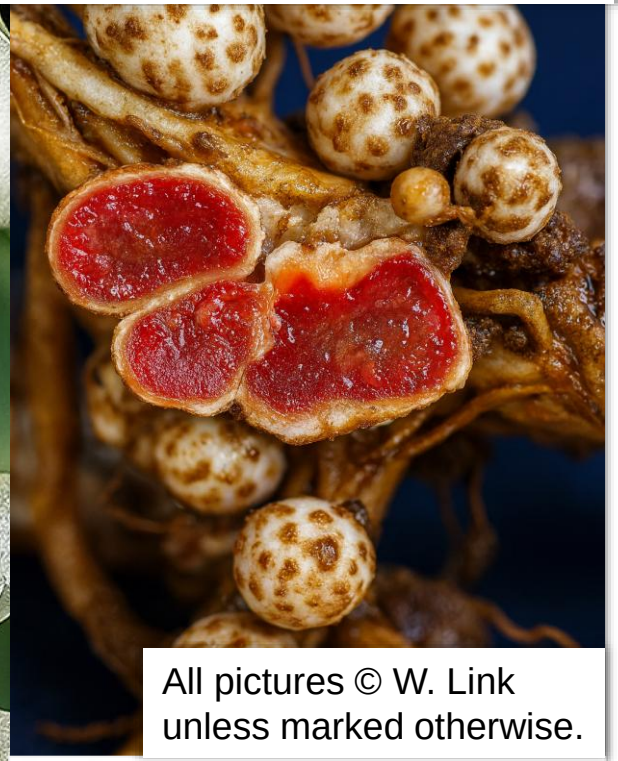
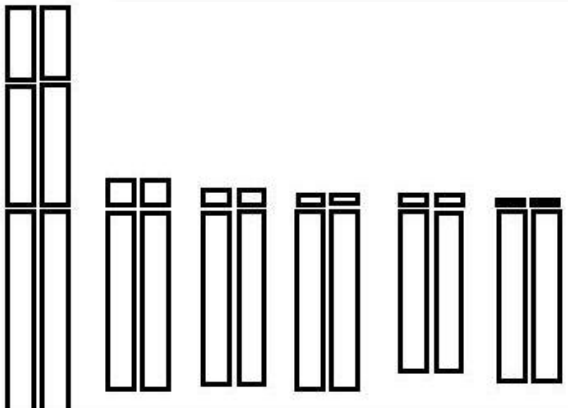
December 2025, Quedlinburg. Faba bean Workshop at JKI. Wolfgang Link:
Faba bean's dialogue across generations. The Old; the Untold; the New. And you: Breed for good - feed and food.

1

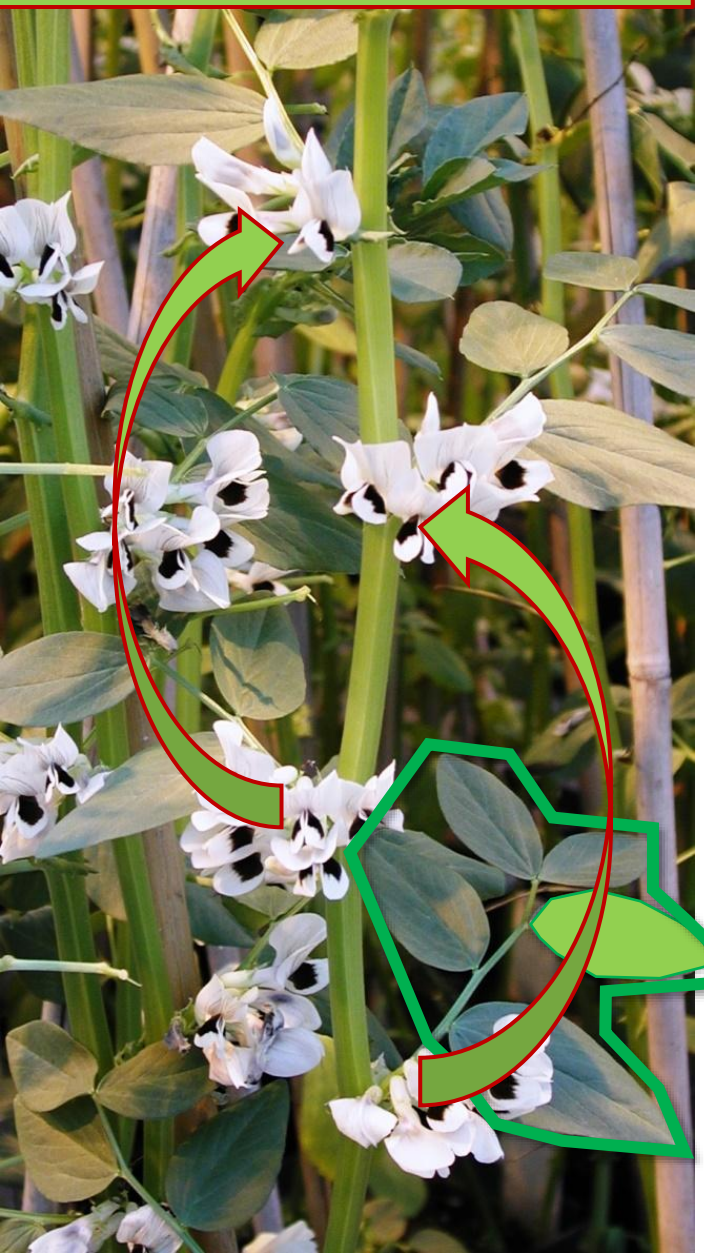
3 x With ChatGPT





After Fuchs et al., 1998. Chromosome Research 6, 219-230

Dormer, 1954. Symmetry. Zig-Zag. Vascular connection. Annals of Botany 18(69).



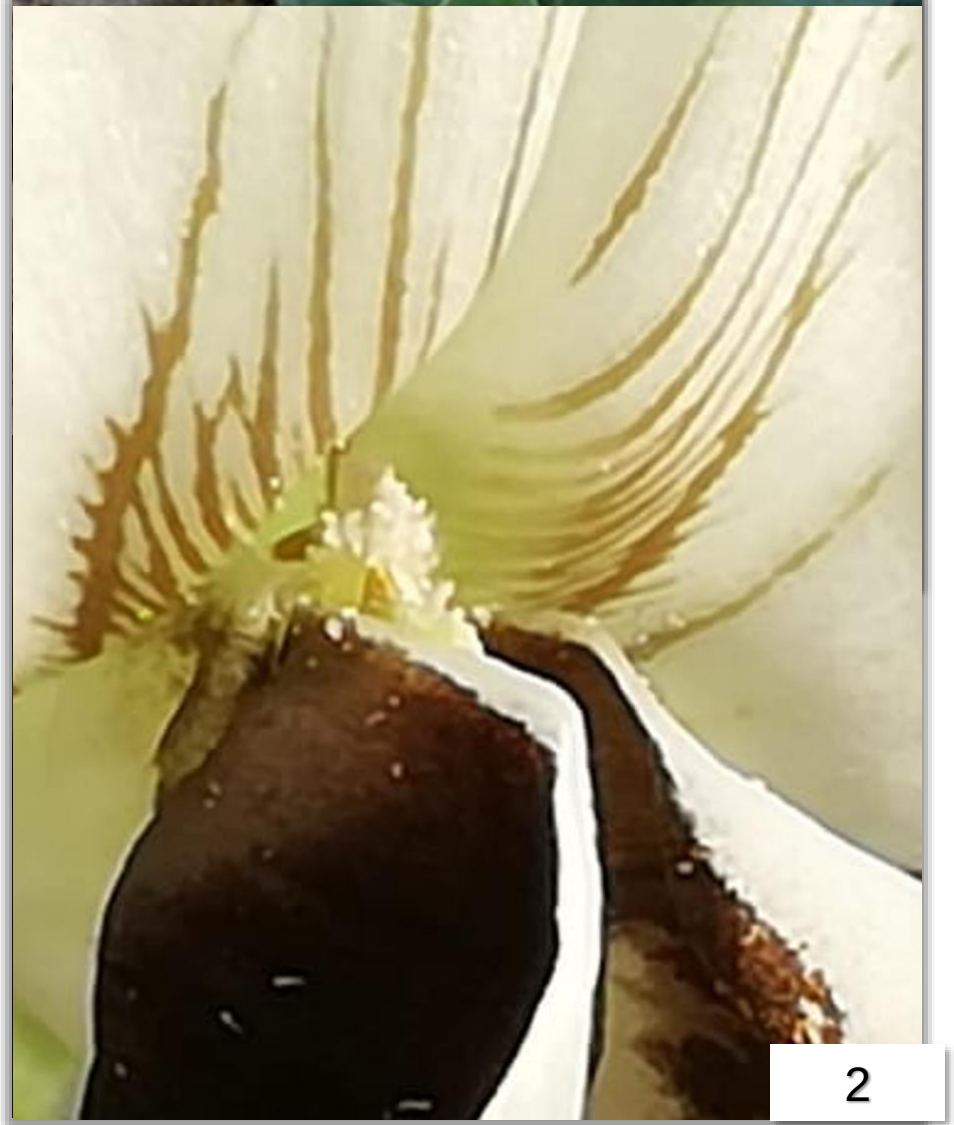
The plant.

Leaflets. Leave. Flower. Inflorescence. Raceme. Indeterminate *vs*. Determinate Growth. Juvenile and adult leaves. Stipule spot. Extrafloral nectaries.

ILB 938, a valuable faba bean (*Vicia faba* L.) accession

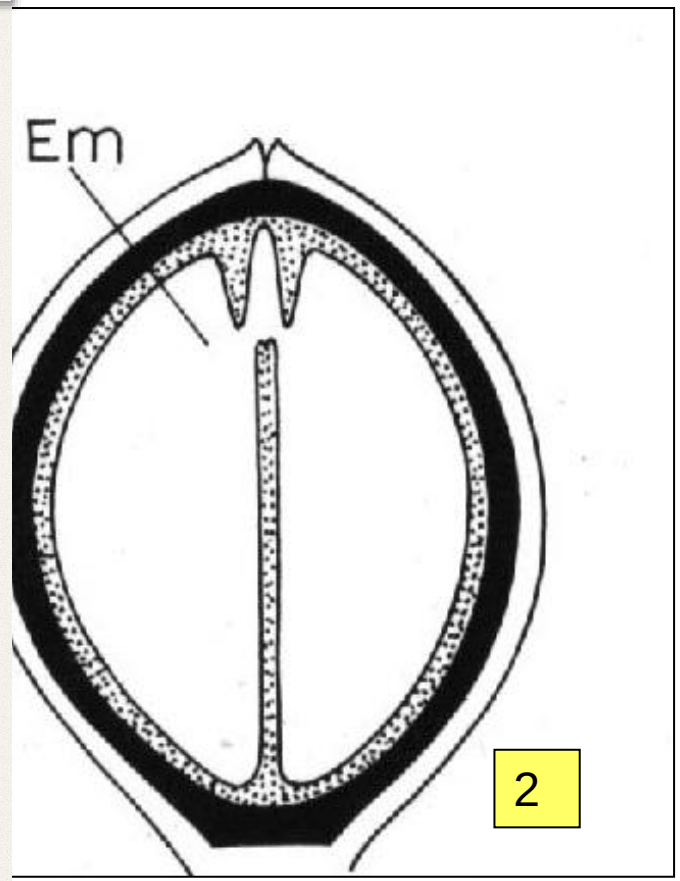
H. Khazaei[1]*, W. Link[2], K. Street[3] and F. L. Stoddard[4]

DOI 10.1017/S1479262118000205



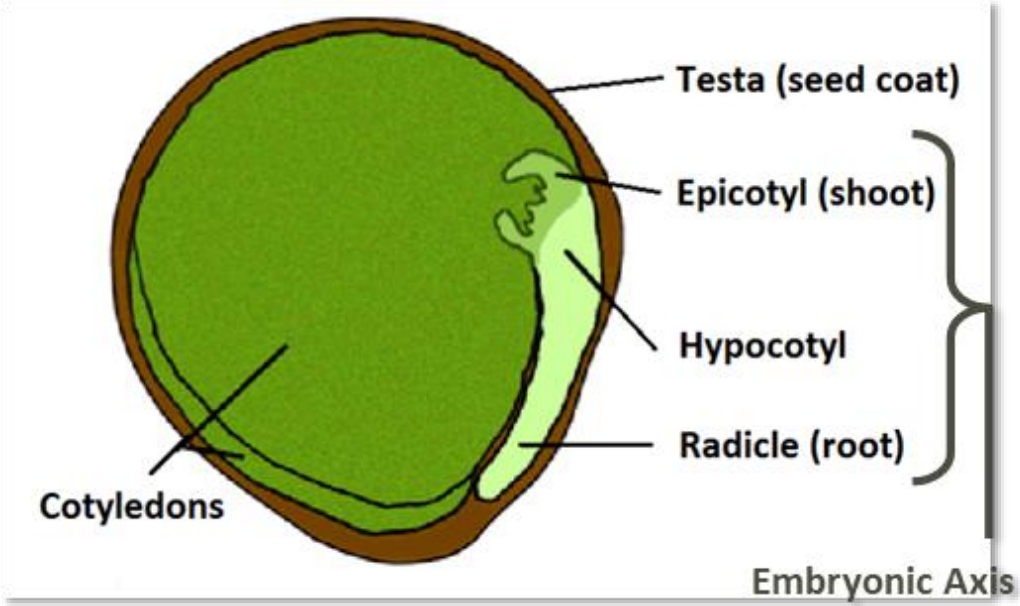
Legumes and other seeds with little or no endosperm are delicate and should be handled with care, not simply
ansport and move, always use rubber pads to ensure smooth curves!

With ChatGPT



ge.

cotyledons (Grain



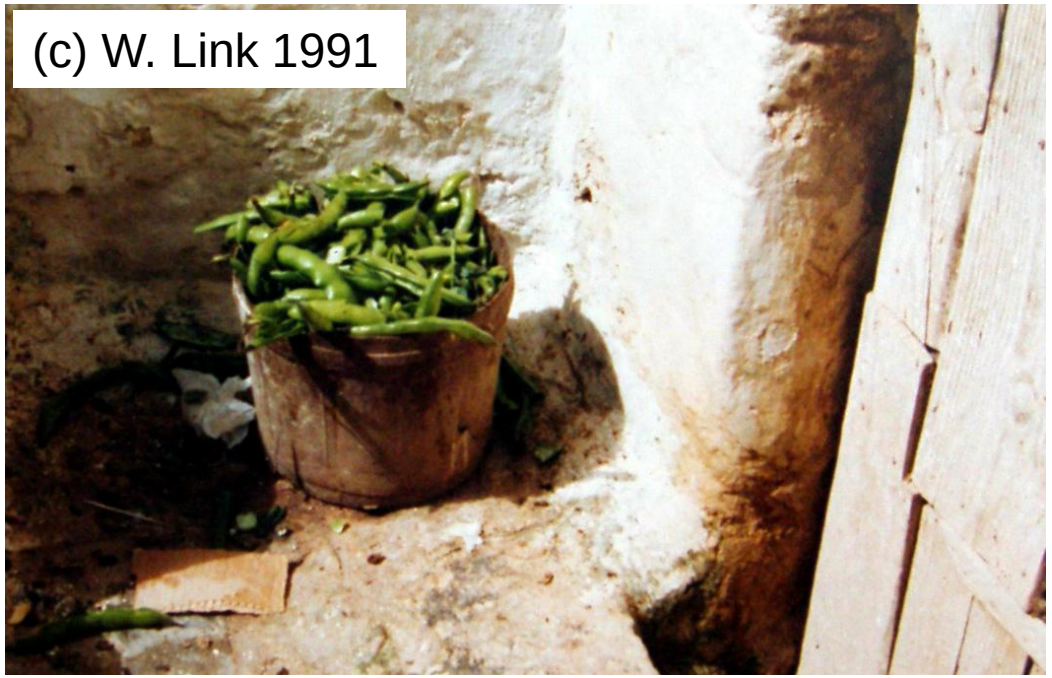
https://saskpulse.com/growing-pulses


GP1D_00002
DVF 1343/
P122517
SL10_00782
Vicia faba paucijuga
GP1D_00030
DVF 3354/
IG124115
GP1D_00133
Peru/Karg-5
Vicia faba major
GP1D_00083
ACEQUIA
Vicia faba equina
GP1D_00024
DVF 3340/
IG115118
SL10_00804
Vicia faba minor
GP1D_00003
DVF 1454/
KORNBERGER-
KLEINKOERNIGE
GP1D_00103
LB 6584
GP1D_00042
DVF 1736

4

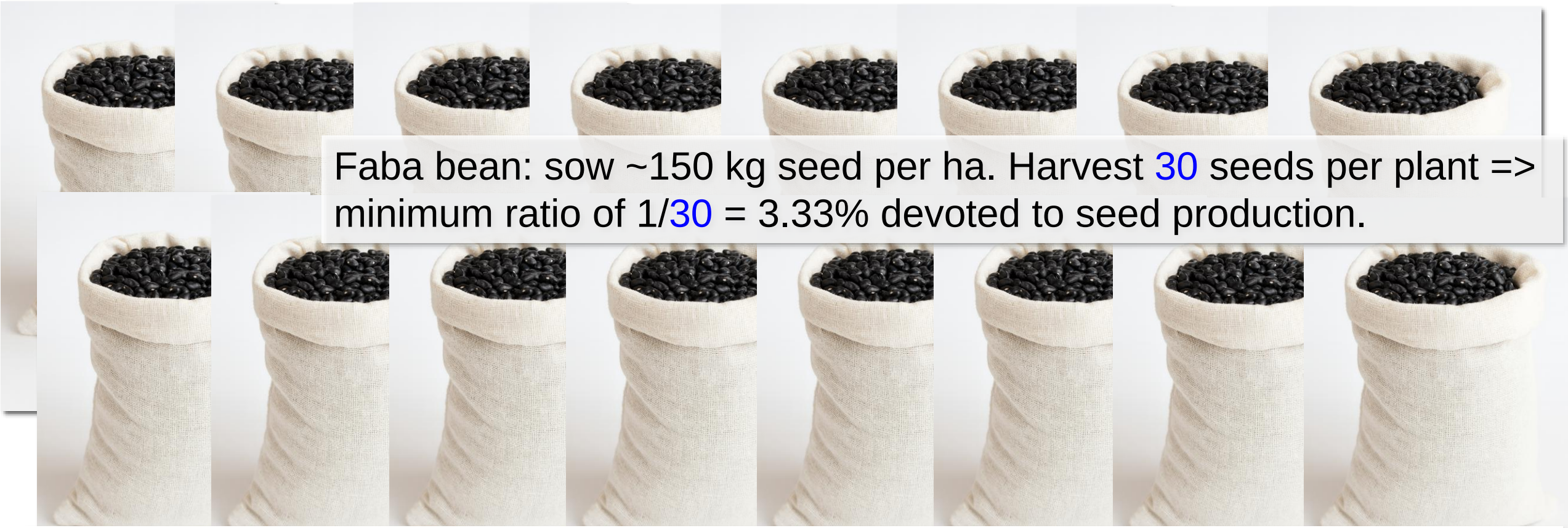
(c) Windhorst A.

An obviously man-made, strange combination of two extreme yield components: very many seeds per pod combined with very large seed.



(c) W. Link 1991

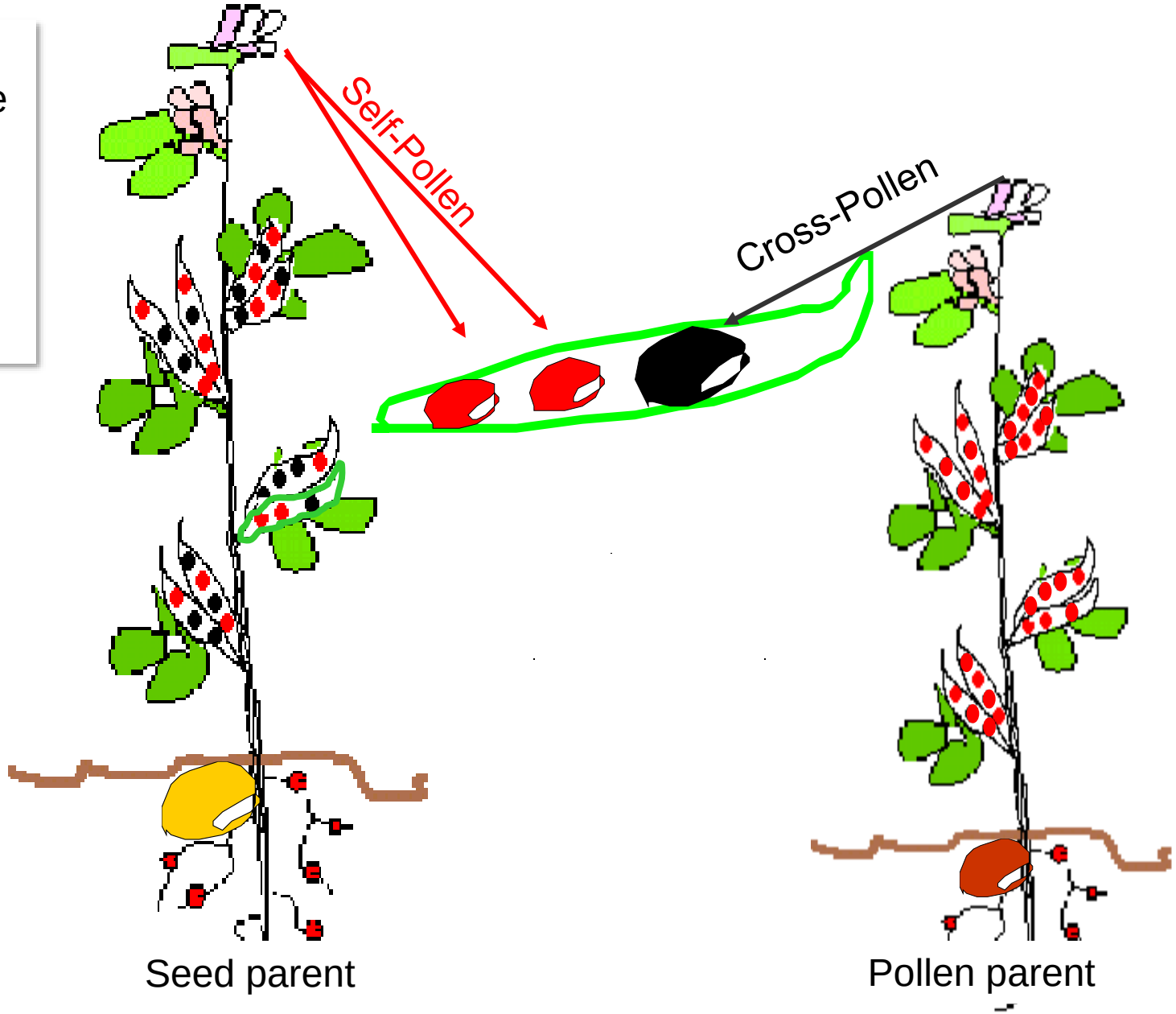
Canola: sow ~3 kg seed per ha. Harvest 1500 seeds per plant => minimum ratio of 1/1500 = 0.066% devoted to seed production.

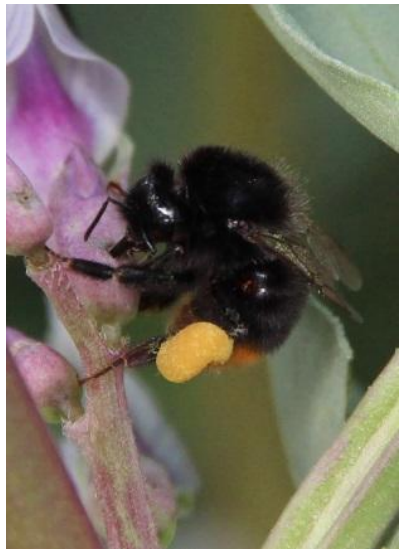


Faba bean: sow ~150 kg seed per ha. Harvest 30 seeds per plant => minimum ratio of 1/30 = 3.33% devoted to seed production.

Seed production area of Tiffany: About 1300ha. Faba bean acreage 2025 ~75.000. About 30% of total seed production (BSL 2005) is for Tiffany. If its acreage is 30% of 75.000ha, then 5-6% of its acreage is for its seed production.

Vicia faba: Reproductive mode is partial allogamy (aka mixed mating; seed partly from selfing and partly from outcrossing)



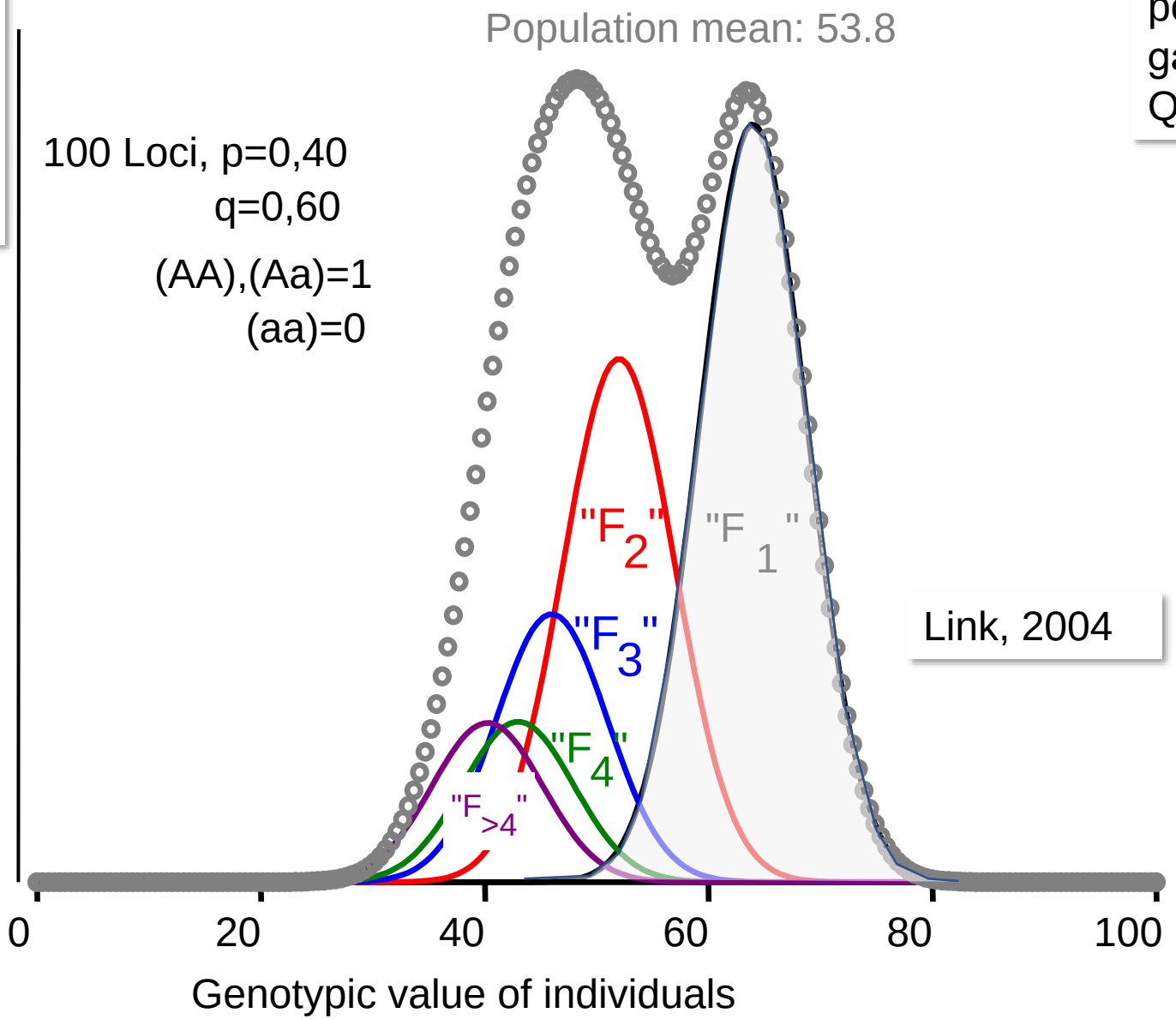


© Marzinzig & Brünjes

B. hortorum is most efficient in causing crossing

Enhanced with ChatGPT

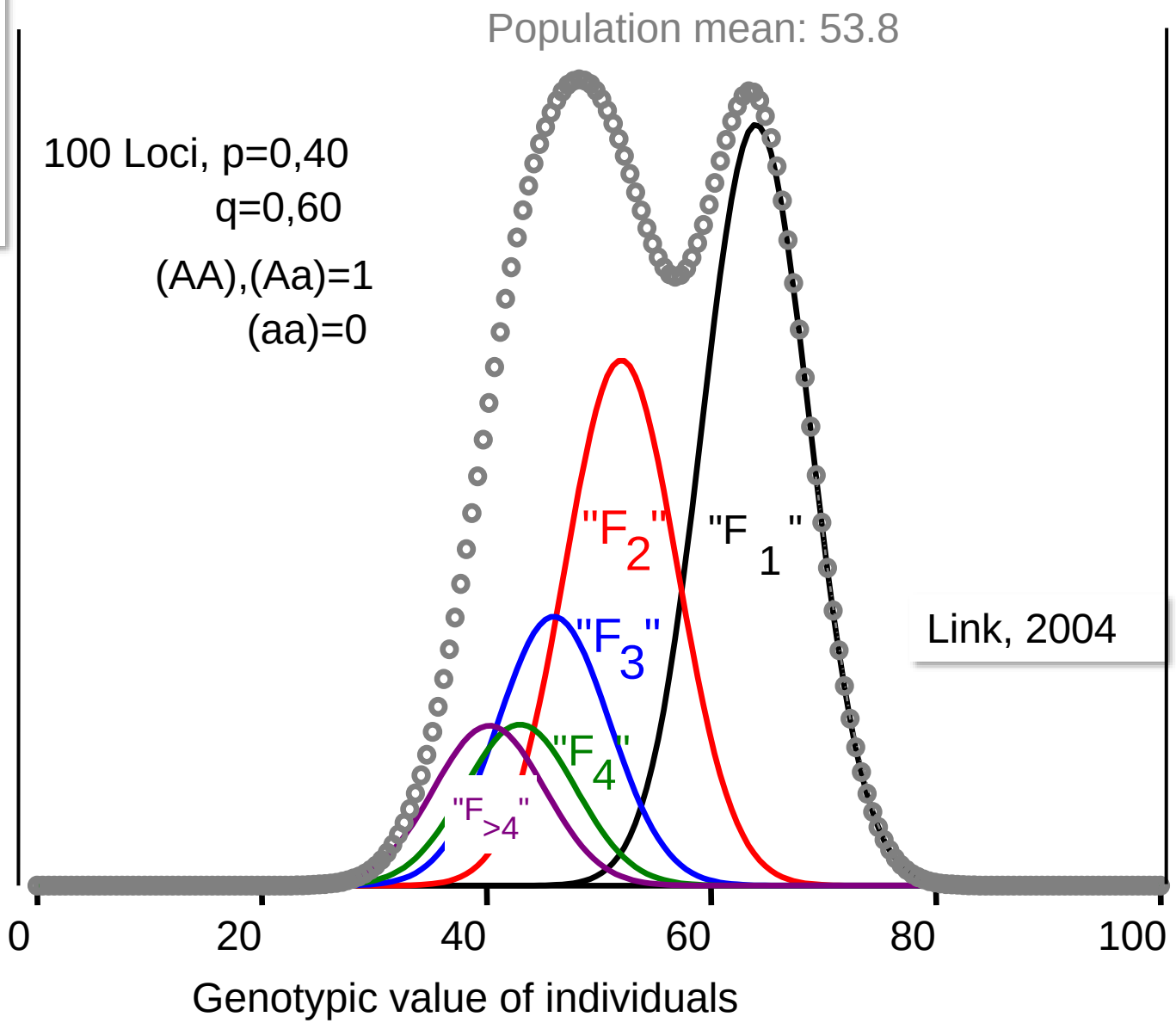
Vicia faba:
Reproductive mode is partial allogamy (aka mixed mating; seed partly from selfing and partly from outcrossing)



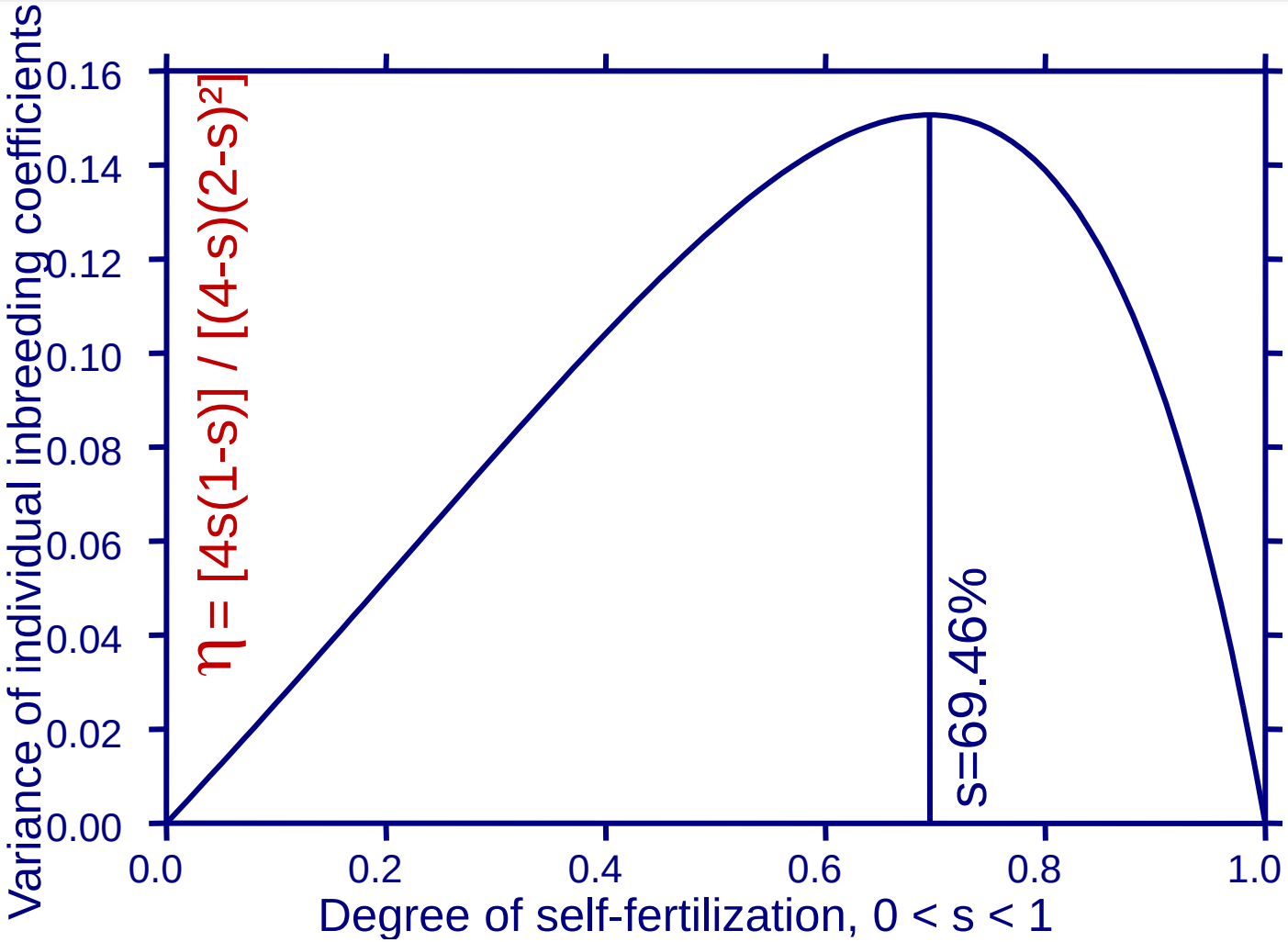
Select the F1-fraction of the population and genetically gain … nothing.
Quelle surprise ;-)

Link, 2004

Vicia faba: Reproductive mode is partial allogamy (aka mixed mating; seed partly from selfing and partly from outcrossing)



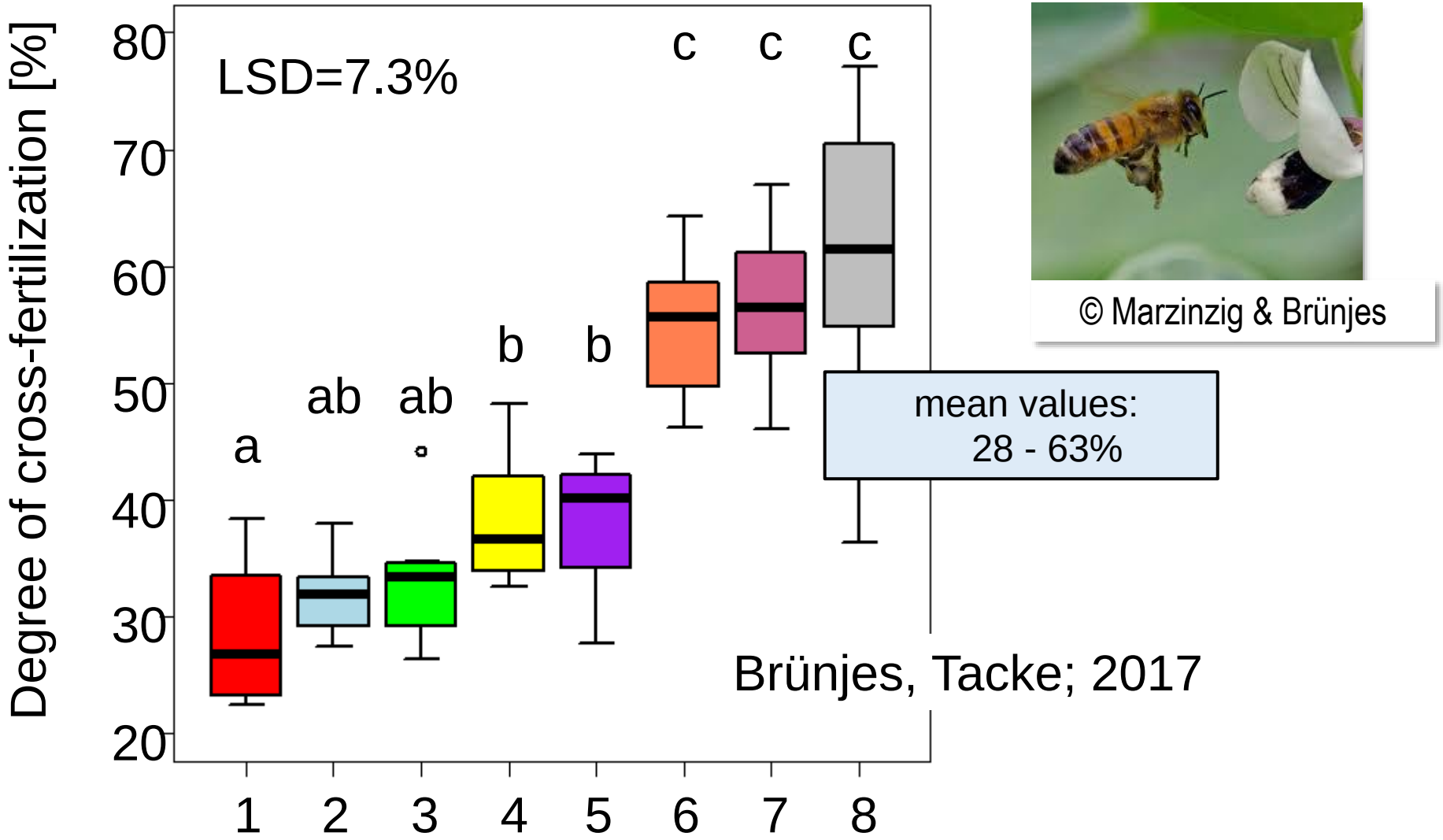
Cross-fertilization of faba beans are such as 40 – 50%. With 69.4%, we have the maximum variance between the individuals of a population for their individual inbreeding coefficients F.



Variance η n of the inbreeding coefficients of individuals of the population.

Genotypes differ for the extent of cross-fertilization: Differences are to some extent inherited.

© Marzinzig & Brünjes



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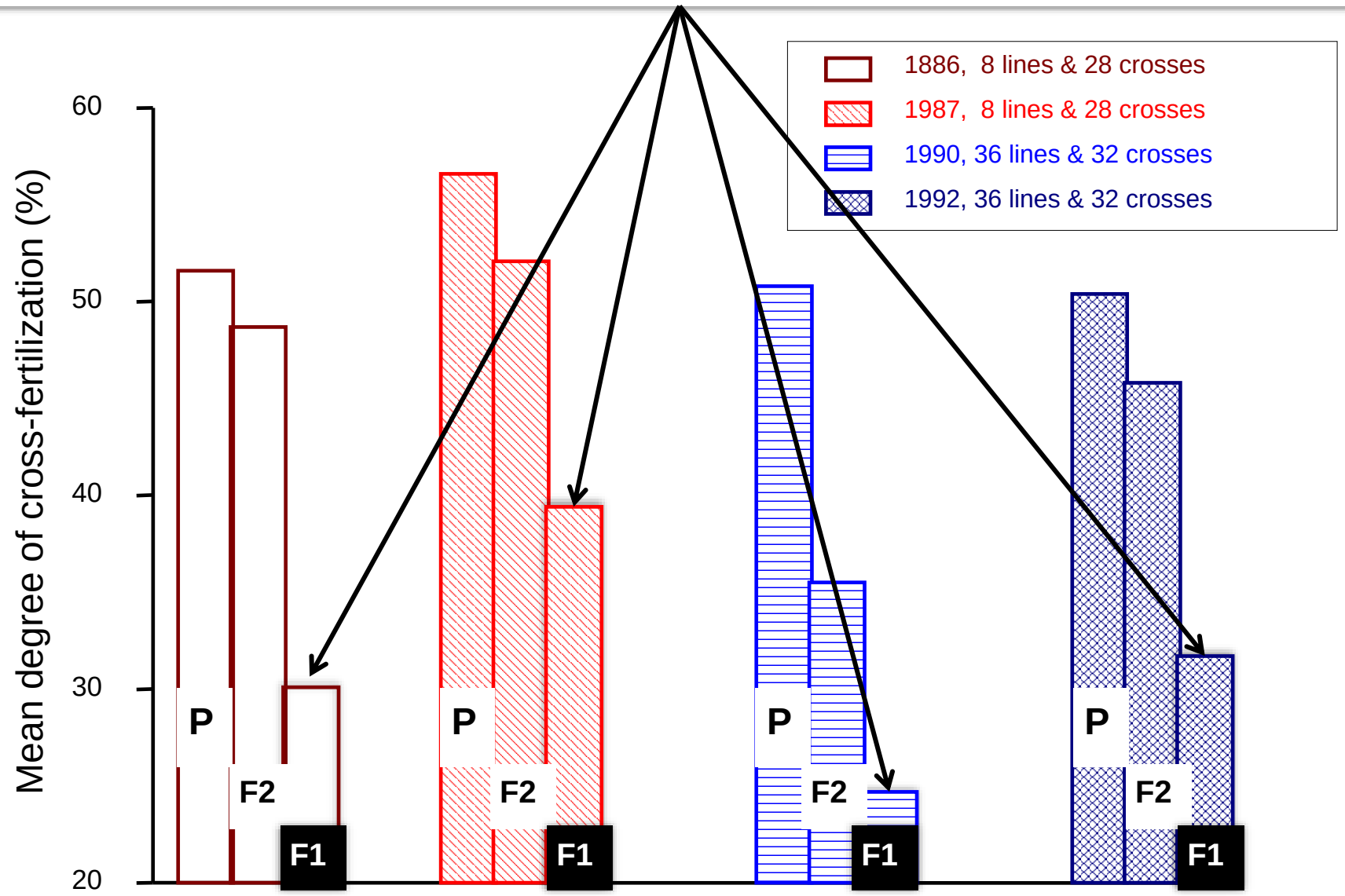
Degree of cross-fertilization of eight winter bean inbred lines

F1 hybrids show lower degree of cross-fertilization than pure lines

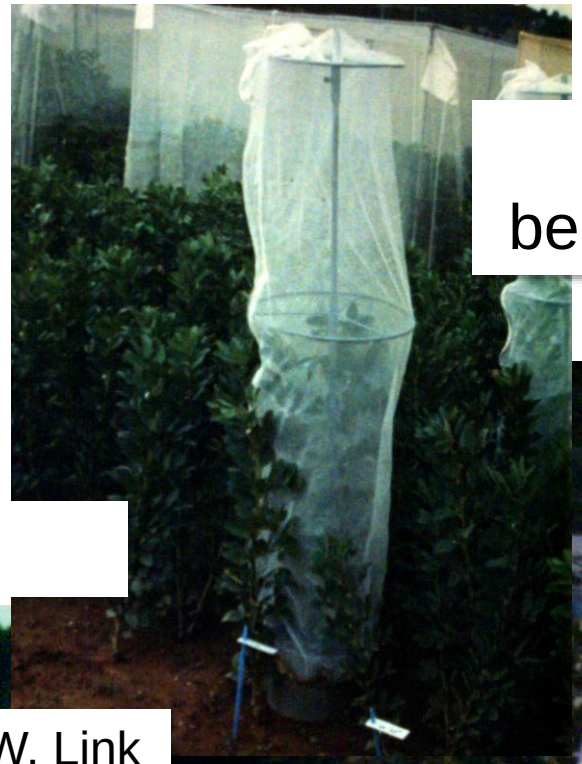


Link et al., 1994

The faba bean breeders, too, sing the high praise of inbred lines. Inbred lines show, for most traits, the maximum amount of genetic variance, and they are immortal — that is, immortal through seed; they can be reproduced and used again whenever needed.

The bean cage, the first step to become a serious faba bean breeder

Rennes, 1989



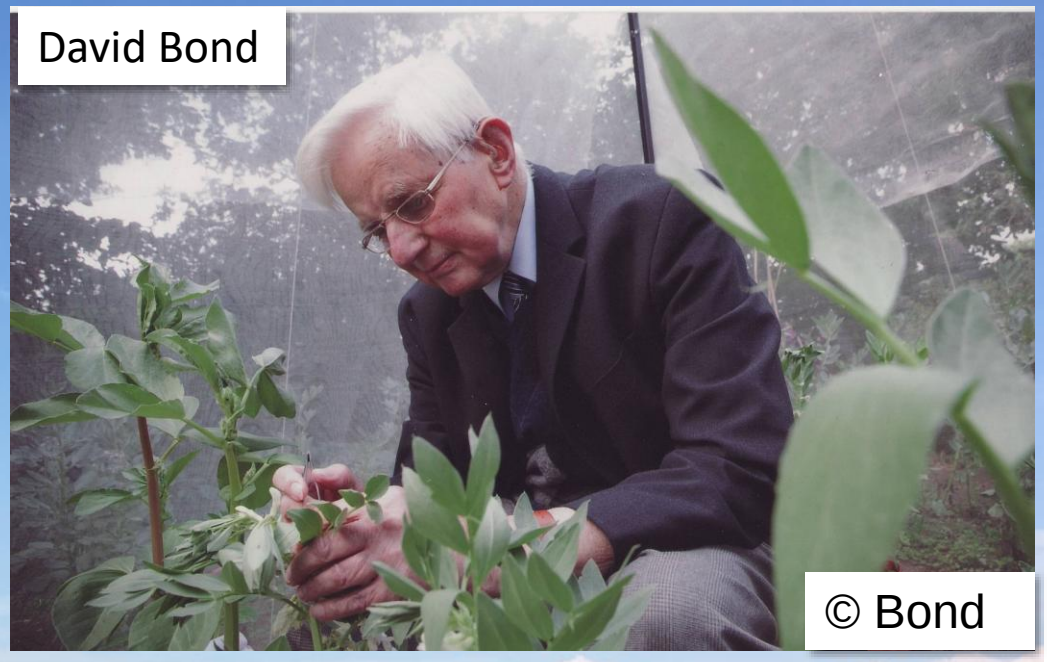
© W. Link

Hohenlieth, 1988

Dijon, 1987

© Link

David Bond



© Bond

Reinshof, faba bean nursery, 2016 (still the ‚good old times‘; well …)

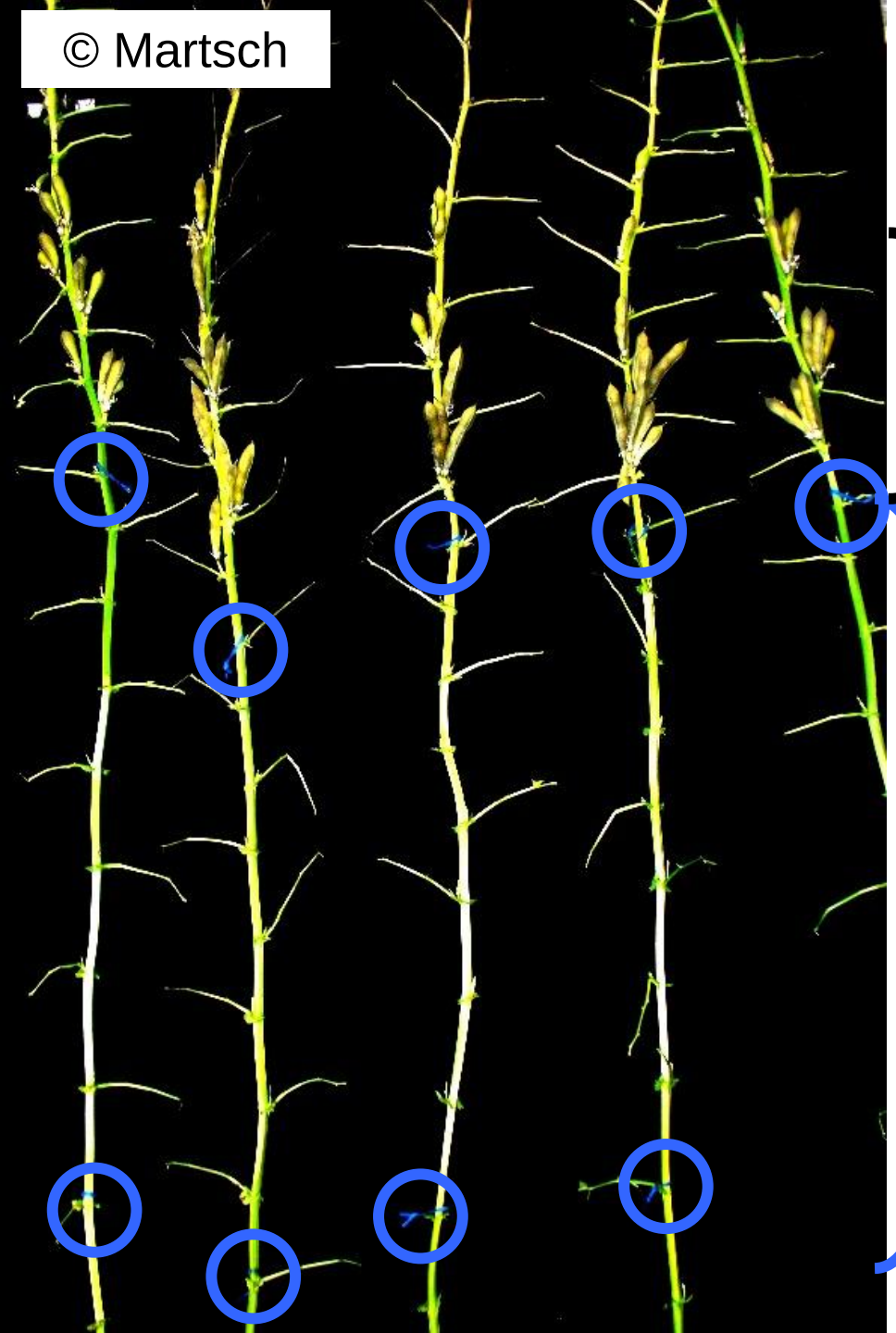
‚At East-Building', Green Foil Houses, 2018 (still …)

Beans locked in, bees locked out

Bohnen einge-sperrt, Bienen ausgesperrt.

Personification of *V. f. via* ChatGPT

WHAT!?
I'm locked in here, my pollinators are locked out, and no one visits me? And I'm supposed to produce seeds? You'll see what happens. Ha!



Drayner, 1959: Self-and cross-fertility in field beans (*Vicia faba* Linn.). The Journal of Agric. Science 53.3:387-403.

Tripped Region shows seed and pod set

Un-tripped region without seed and pod set. Reason: High level of Autosterility

© W. Link

Henri shows to visitors how to do this ‚Tripping' of faba bean flowers.

Journal of Applied Ecology, Vol. 12, No. 3 (1975), pp. 709-717.

THE POLLINATING EFFICIENCY OF HONEYBEE AND BUMBLEBEE VISITS TO FIELD BEAN FLOWERS (*VICIA FABA* L.)

BY D. A. KENDALL AND B. D. SMITH

Pollinator's direct and indirect positive impacts

- Direct positive impact of pollinators. They trip, this stabilizes fertilization and yield.
- Indirect positive impact of pollinators: Cross-fertilization allows heterotic increment for offspring.

In our latitudes, faba bean – after successful fertilization - is dawdling instead of getting started.

It is idly ‘twiddling its thumbs’ and seems to ask: ‘Should I start setting this pod or should I wait a little longer?’

With ChatGPT

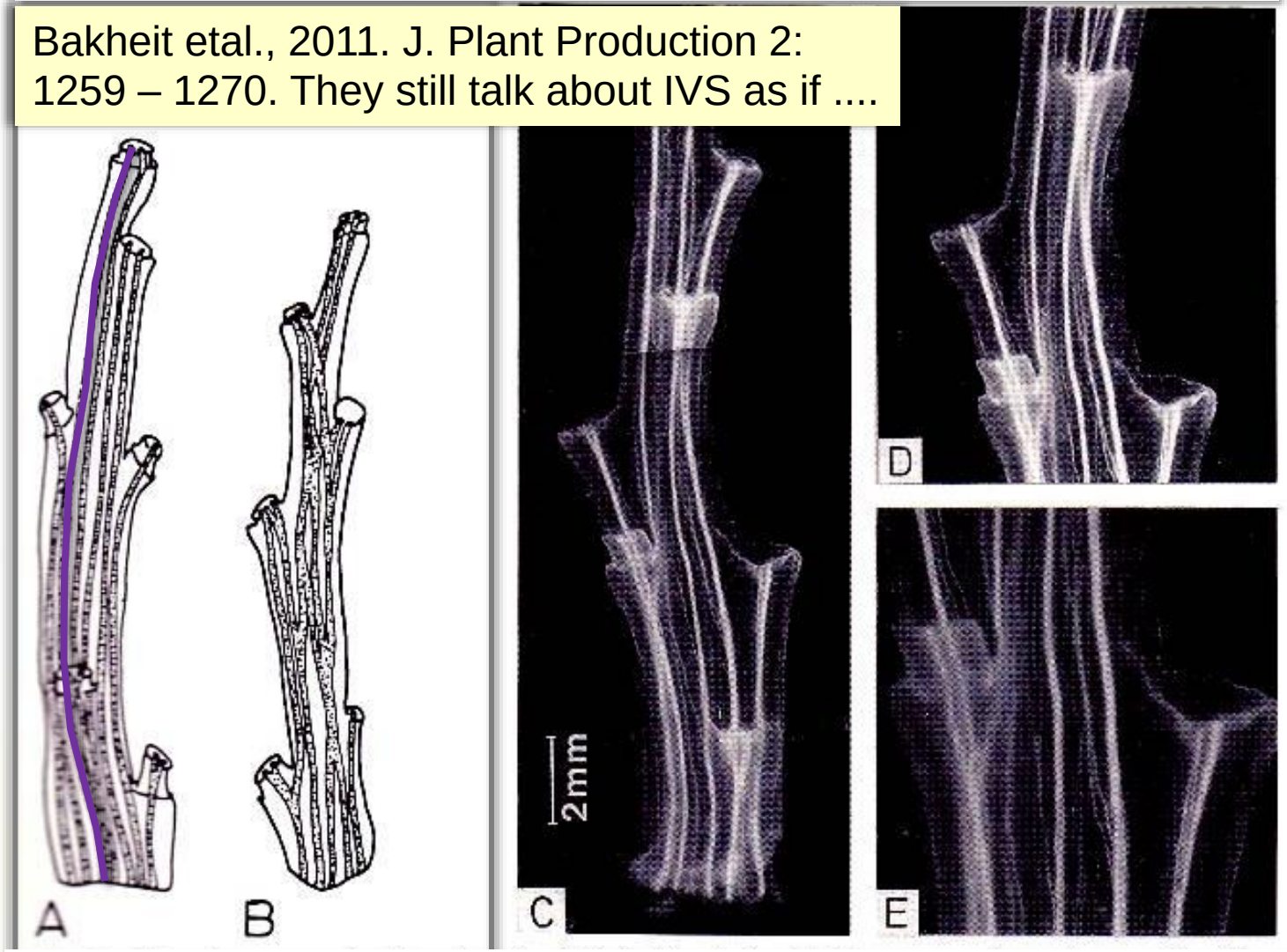
Nico Seifert with Sonja Yaman, 2020. Master-Thesis.
Genetic differences for time lag before starting pod growth.

Pea is better-behaved, quickly starting pod growth.

An other Fata Morgana: Independent Vascular Supply, IVS

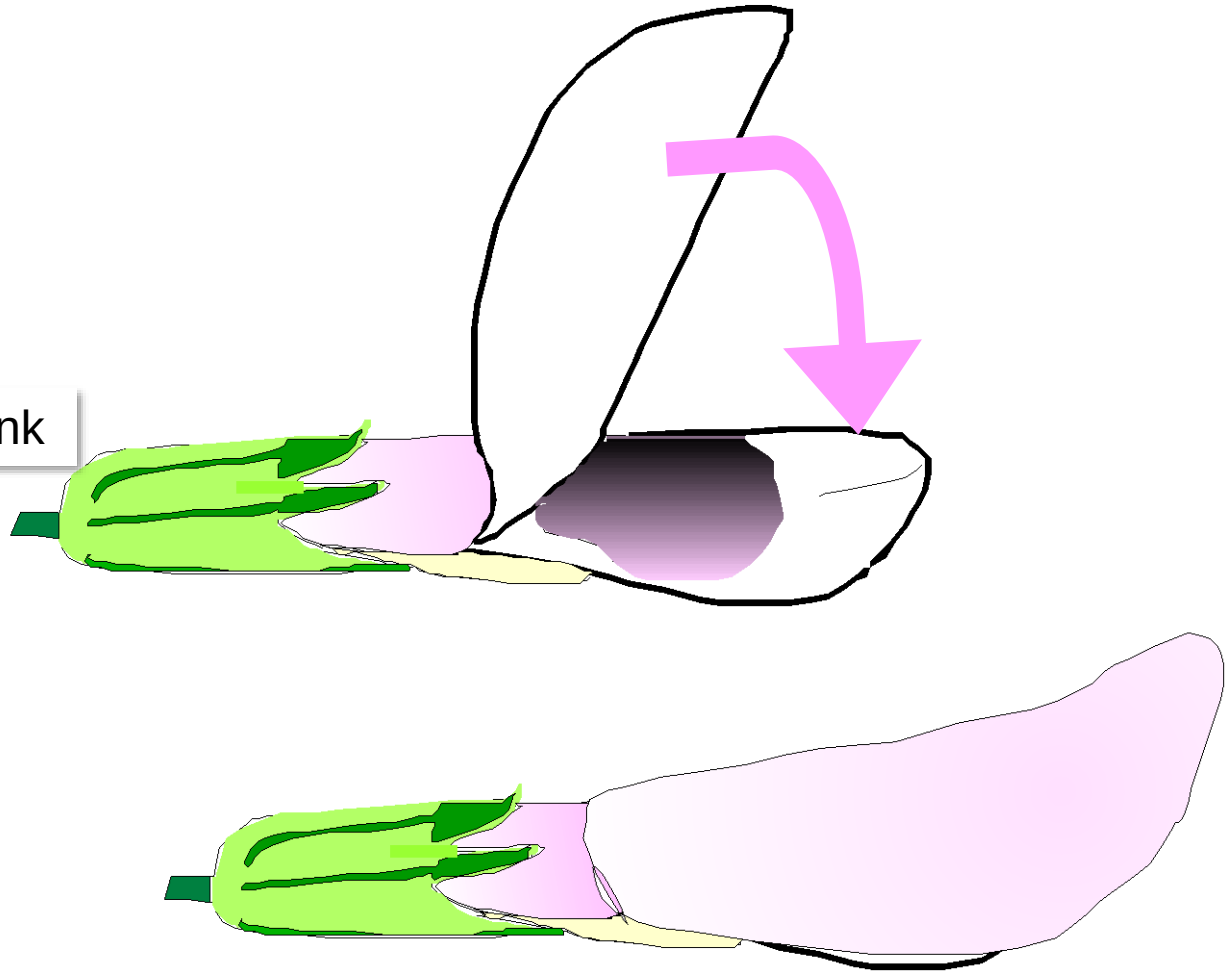
Bakheit etal., 2011. J. Plant Production 2: 1259 – 1270. They still talk about IVS as if ....

Ruckenbauer und Mollenkopf, 1986: Reinvestigation of the architecture of the vascular system within racemes in faba beans. Plant Breeding 97, 164 – 167.



Vascular system in the peduncle of *Vicia faba*. A-B: Two types of vascular supply of the peduncle after Gates et al. (1983). Diagram shows independent vascular supply to each flower. C-E. True pattern of the vascular system of faba bean.

Turn to pure self-fertilization? Inbred lines offer up to twice genetic variance to the breeder‘s equation. Line Breeding is ‚easier‘ and more direct than Population Breeding or Hybrid Breeding (*per se* instead of GCA). … the high praise of inbred lines ….



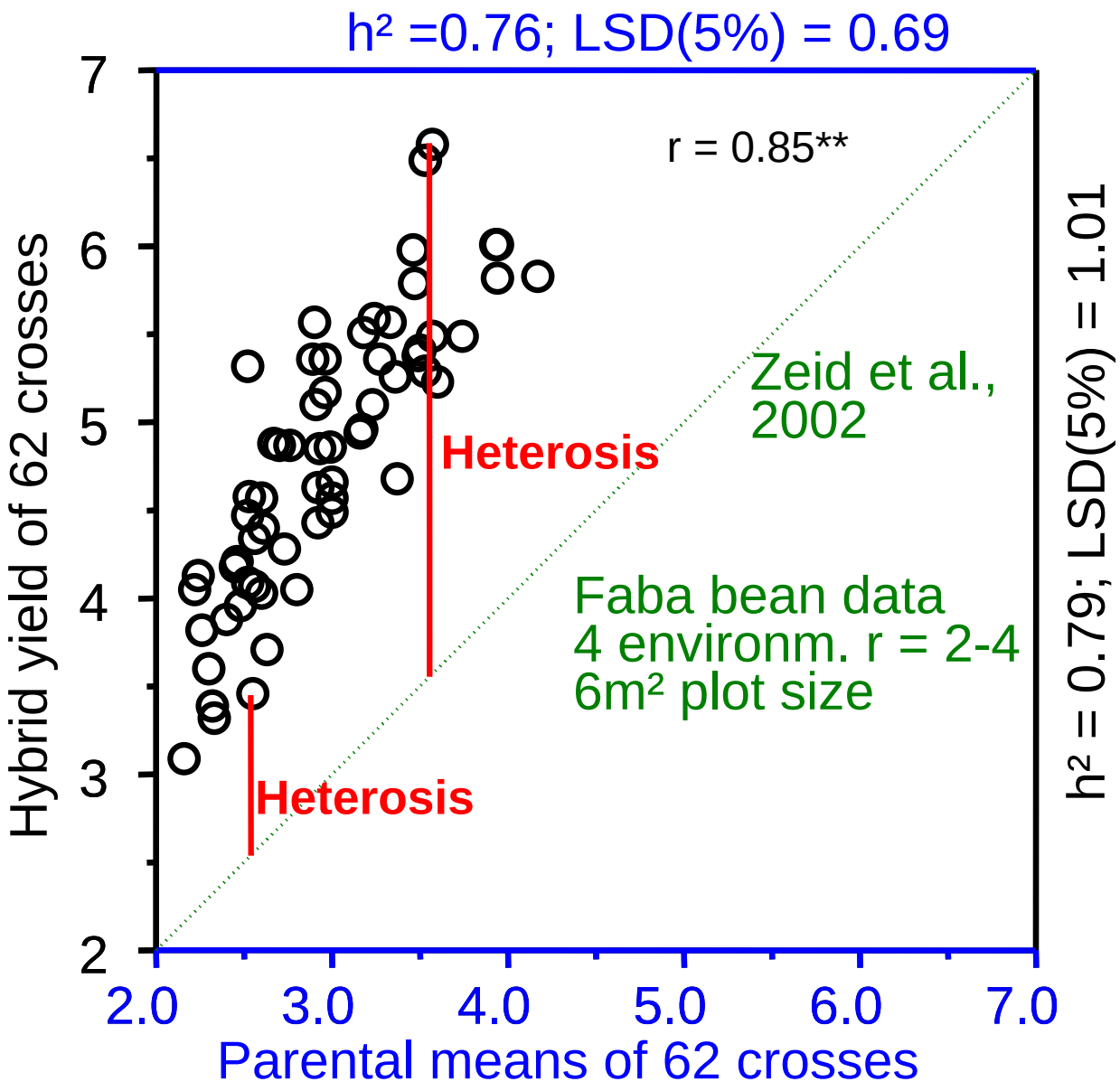
Obligate autogamy in *Vicia faba* L. due to closed flower type (Poulsen, 1977)

‘Wild’ type

© Martsch

‘Closed flower’-type. Monogenic recessive.

Ironically, it seems that the closed flower type, which is hardly ever ‘legally’ visited by pollinators, tends to be highly autosterile; meaning that it actually needs pollinators to do tripping.
Martsch und Link 2005-2012, unpublished;
Stoddard, 1986, DOI 10.1111/j.1439-0523.1986.tb01048.x.



Heterosis; Hybrid vigour

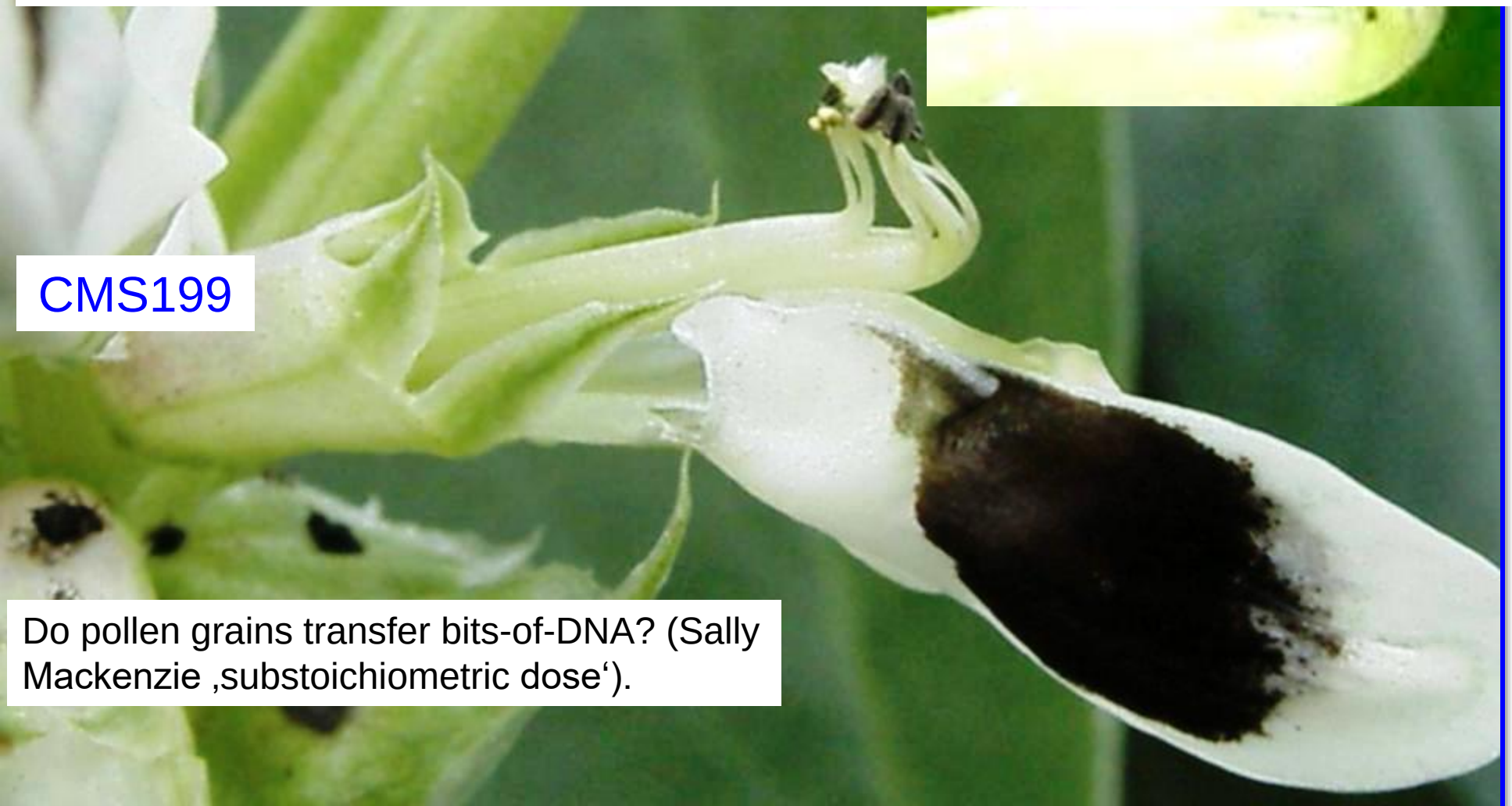
Heterosis.
In vollem Karacho; als gäb's kein Morgen.
Hm ... With ChatGPT


© Martsch
CMS199

Substoichiometric shifting in the plant mitochondrial genome is influenced by a gene homologous to MutS

Ricardo V. Abdelnoor*†, Ryan Yule*, Annakaisa Elo*, Alan C. Christensen‡, Gilbert Meyer-Gauen*, and Sally A. Mackenzie*§

2003



CMS199

Do pollen grains transfer bits-of-DNA? (Sally Mackenzie ‚substoichiometric dose').

All four systems are unstable, not fit for use

CMS 447 (UK winter bean)
(Maintainer Ad23)

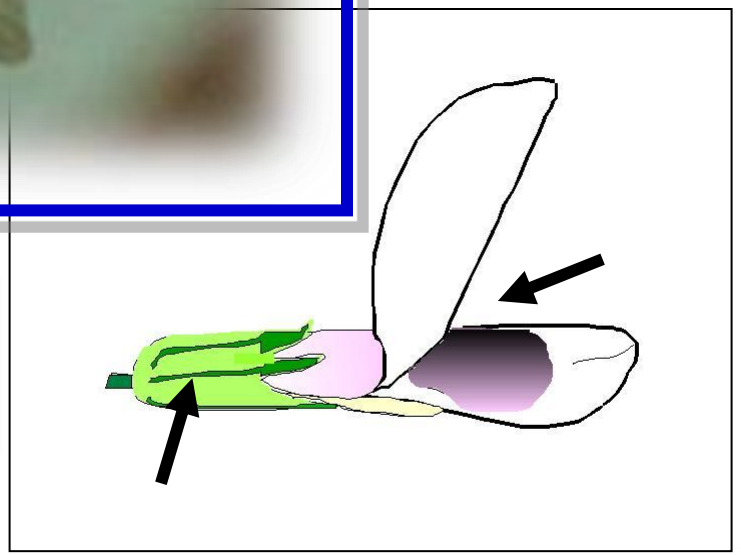
CMS350 (UK bean)
(Maintainer G58)

CMS297 (Egypt)
(Maintainer Afg370)

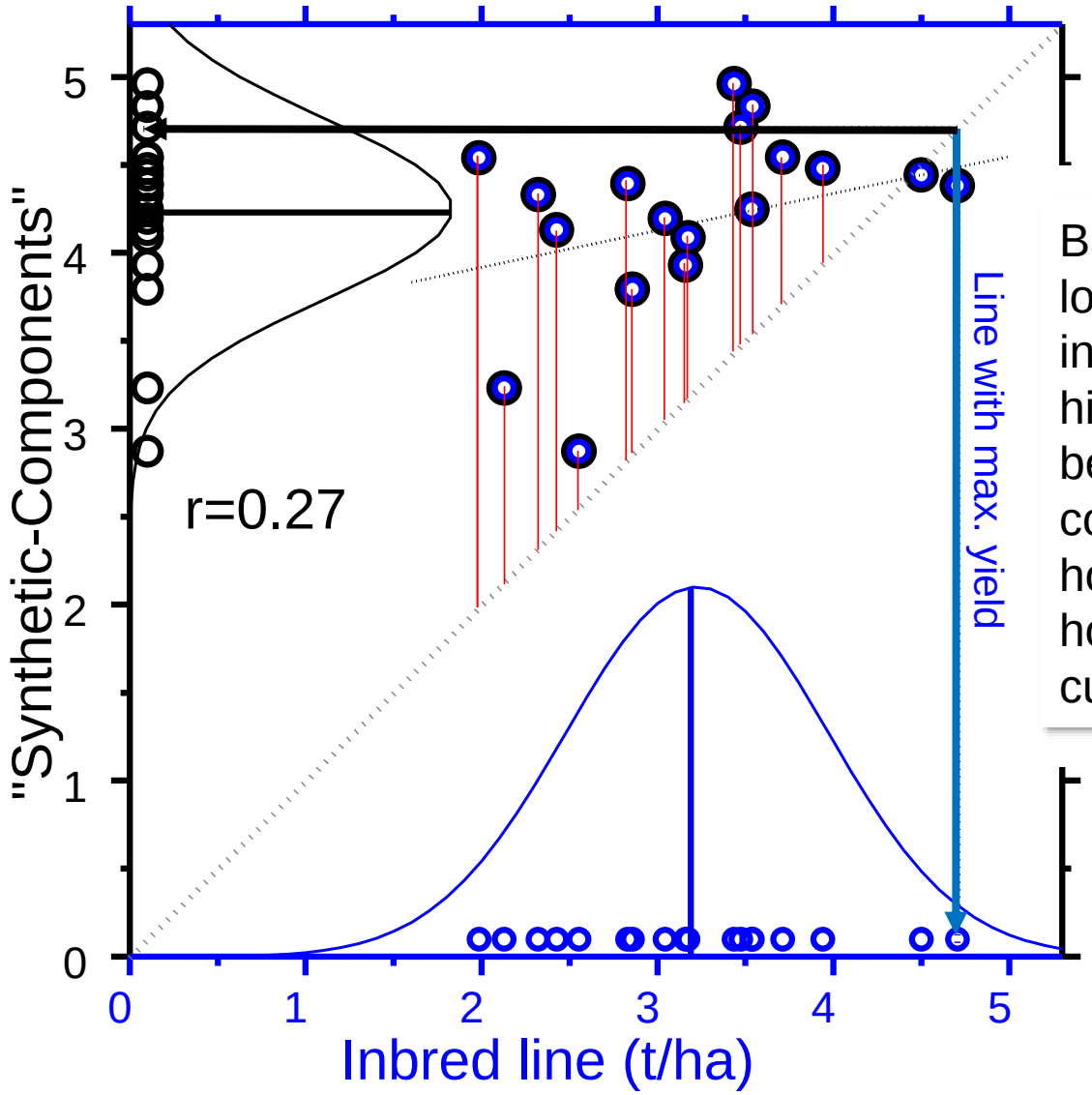
CMS199 (Afghanistan)
(Maintainer Afg187)

Bombus-bitten holes to ‚steal' nectar

Pollination of pollen-devoid CMS-lines?



Exploit a share of Heterosis *via* Population Breeding. Experimental data from Link and Ghaouti, 2007.



Balance between lower average yield of inbred lines and higher variation between inbred lines compared to non-homogeneous non-homozygous types of cultivars

GCA: General combining ability. Focussing on non-inbred type of cultivars (F1-hybrid, population cv.).

GVA, general varietal ability. Focussing on partly inbred cultivar (synthetic; F=1/N; S > 0 => F > 1/N).

Breeding Value: F=0
Breeding Value: 0<F<1
Breeding Value; F=1

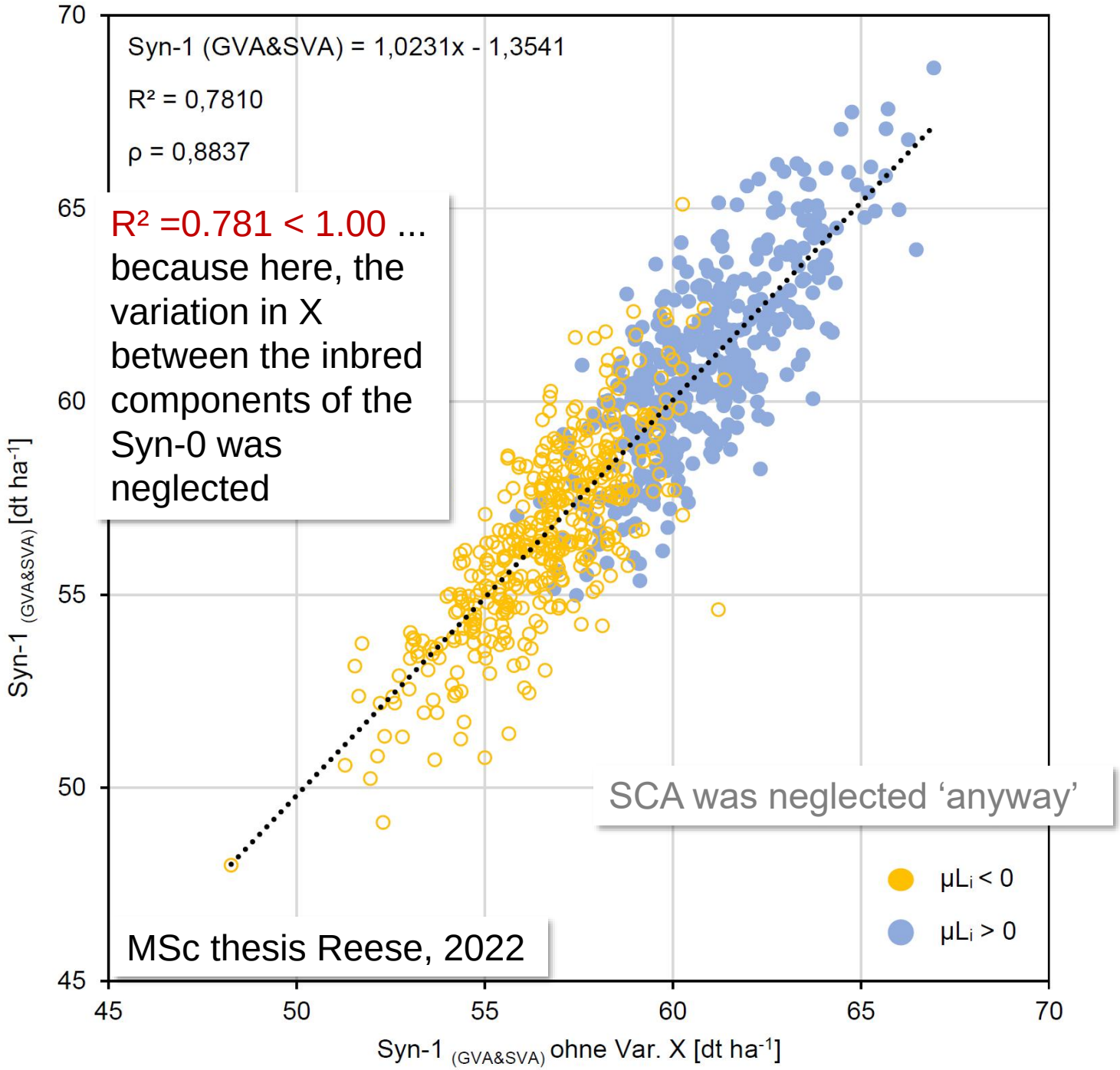
With Judith Reese and Lisa Brünjes:
Have fun with algebra and refine GCA and GVA down to the penultimate branch.

$$\text{Syn-1}\ (k) = \mu_L + \mu_X \cdot \left(1 - \frac{1}{k}\right) \cdot (\mu_C - \mu_L) + \frac{1}{k} \sum_{i=1}^{k} [(\mu_X + X_i) \cdot P_{ii}] \cdot \mu_L + \frac{1}{k} \cdot \sum_{i=1}^{k} [1 - \mu_X \cdot \left(1 - \frac{1}{k}\right)] \cdot L_i + \frac{1}{k} \cdot \sum_{i=1}^{k} [(\mu_X + X_i) \cdot P_{ii}] \cdot L_i + \frac{1}{k} \cdot \sum_{i=1}^{k} \mu_X \cdot [(1 - \frac{1}{k}) \cdot 2GCA_i] + \frac{1}{k} \cdot \sum_{i=1}^{k} [X_i \cdot (1 - \frac{1}{k}) \cdot [(\mu_C + GCA_i - \mu_L - L_i)] + \frac{1}{k^2} \cdot \sum_{\substack{i,j=1 \\ i \neq i}}^{k} (X_i \cdot GCA_j) + \frac{1}{k} \cdot \sum_{\substack{i,j=1 \\ i \neq i}}^{k} [(\mu_x + X_i) \cdot P_{ij} \cdot (\mu_C + GCA_i + GCA_j)]$$

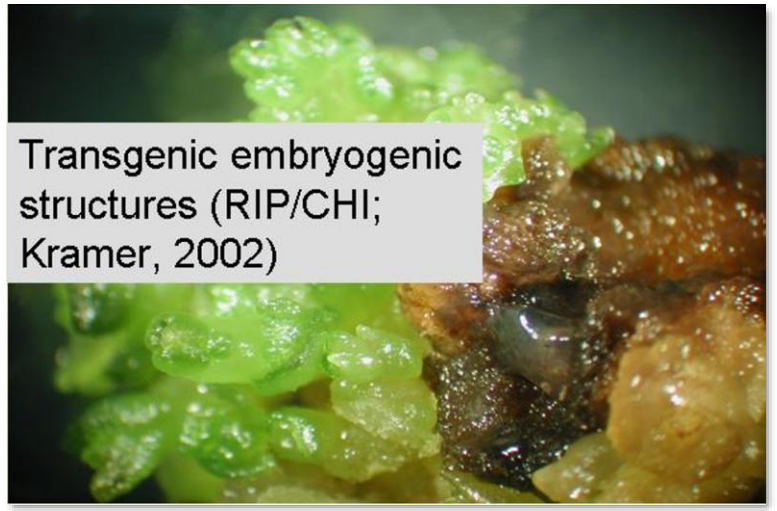
SCA was neglected ‘anyway’

With Judith Reese
and Lisa Brünjes, 2022

Faba bean polycross or, if you like, Syn-0.
© L. Brünjes



Kramer & Möllers 2002



Faba bean is stubborn.

Make it homozygous, is will outcross more than before

Make F1, it will outcross less than before

It will not allow interspecific crossing

It will not (?) regenerate from protoplasts

It will not produce embryoids & haploid plant & DH from microspores

It will not (?) produce roots after Agrob. t. - mediated gene transfer

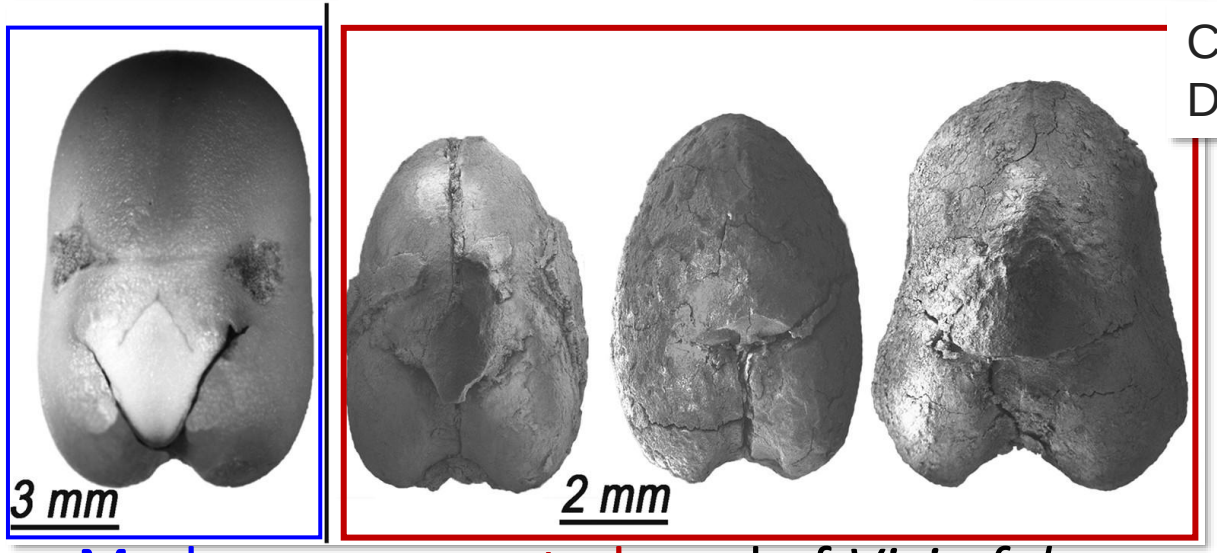
It will not (?) produce shoots after Agrob. rhiz.-mediated transfer

It will not give us (?) a stable CMS system

What else?

I does not (?) offer resistances against insects (*Aphis fabae*, *Bruchus rufimanus, Sitona lineatus*)

It does not steer pollinators to pollinate if it has not pollen but, instead, let them steel nectar without doing the proper job....



Caracuta et al., 2015.
DOI 10.1038/srep14370

Modern *vs* excavated seed of *Vicia faba*

© Yaman

SCIENTIFIC REPORTS

OPEN

14,000-year-old seeds indicate the Levantine origin of the lost progenitor of faba bean

Received: 13 June 2016
Accepted: 27 October 2016

Valentina Caracuta[1,2], Mina Weinstein-Evron[3], Daniel Kaufman[3], Reuven Yeshurun[3], Jeremie Silvent[4,†] & Elisabetta Boaretto[1,2]

THE LOST ANCESTOR OF THE BROAD BEAN (*VICIA FABA* L.) AND THE ORIGIN OF PLANT CULTIVATION IN THE NEAR EAST

© 2014 г. **O.E. Kosterin**

Vicia pannonica
(with ChatGPT

Doubled-haploid production in chickpea (*Cicer arietinum* L.): role of stress treatments

Journal of Plant Physiology

Original Paper | Published: 19 June 2009

Volume 28, pages 1289–1299, (2009)

ELSEVIER

ScienceDirect

www.elsevier.de/jplph

Pea, grass pea, chickpea, *Medicago truncatula*

Abiotic stress enhances **androgenesis** from isolated microspores of some legume species (*Fabaceae*)

S. Ochatt[a,*], C. Pech[a], R. Grewal[b], C. Conreux[a], M. Lulsdorf[b], L. Jacas[a]

[a]*INRA, UMR 102, UMRLEG, B.P. 86510, F-21000 Dijon, France*
[b]*Crop Development Centre (CDC), University of Saskatchewan, 51 Campus Drive, Saskatoon SK, Canada S7N 5A8*

Received 17 September 2008; received in revised form 16 January 2009; accepted 19 January 2009

Microsporogenesis in faba bean (*Vicia faba* L.) grown in Mersin, Turkey

Aslı Küçükrecep [1], Dilek Tekdal [2,*] 2022

Critical Reviews in Plant Sciences, 25:139–157, 2006

ISSN: 0735-2689 print / 1549-7836 online
DOI: 10.1080/07352680600563850

Toward Doubled Haploid Production in the Fabaceae: Progress, Constraints, and Opportunities

Abo-Direkt. Straight to resistance, quality and yield with faba bean lines

Organic eprints

er uns Blättern Neuzugänge Hilfe

Anmelden | Registrieren

Direkt zu Resistenz, Qualität und Ertrag mit Ackerbohnen-Linien (Abo-Direkt)

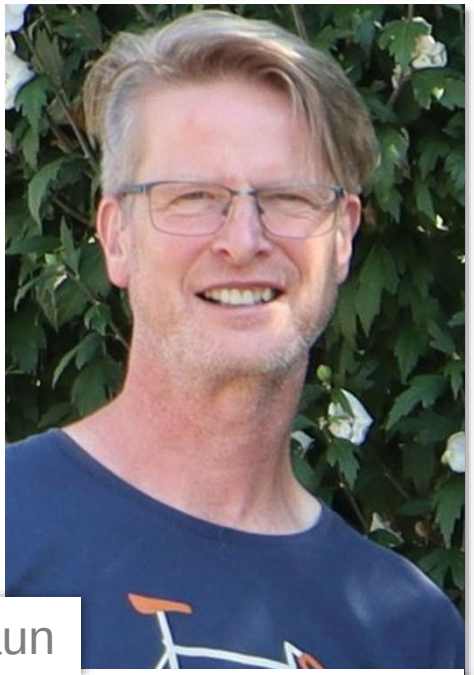
{Projekt} Abo-Direkt: *Direkt zu Resistenz, Qualität und Ertrag mit Ackerbohnen-Linien (Abo-Direkt)*. [Straight to resistance, quality and yield with faba bean lines.] Laufzeit: 2022 - 2025.
Leiter/in: Link, apl. Prof. Wolfgang, Georg-August-Universität Göttingen, D-Göttingen .

Until “recently”, Moemen S. Hanafy was (has been) the only person who successfully transformed *Vicia faba*

GMO

PR10a transgene and wild type *Vicia faba* (Tattoo) in a drought stress setting
Photo 3 weeks after begin of drought stress.
(Jacobsen and Hanafy, 2011, Hannover).
PR10a: Pathogenesis-related protein from rice, abscisic acid-activated signaling pathway

Moemen S. Hanafy
Plant Biotechnology
Department, Biotechnology
Research Institute, National
Research Centre, Tahrir Str,
Dokki, 12311, Cairo, Egypt



Michael Wallbraun

AlPlanta
BMBF. 01.07.2018 – 30.06.2020
https://www.pflanzenforschung.de/de/forschung-plant-2030/projekte/26/detail

ViciaMut
031B0545A-B

DNA-freie Induzierung von sequenzspezifischen Mutationen mit Hilfe des CRISPR/Cas-Systems bei der Körnerleguminose Vicia faba

Herr Dr. Michael Wallbraun

© JLU Giessen Snowdon-Team

Gene editing strategies for creation of novel genetic diversity for faba bean breeding

Mamunur Rashid

ACGG Cohort 1, JLU

Read more

Thomas Pickardt

Mamunur Rashid

The first objective is to optimize the genetic transformation protocol in faba bean.
JLU Giessen-Website, 2025.

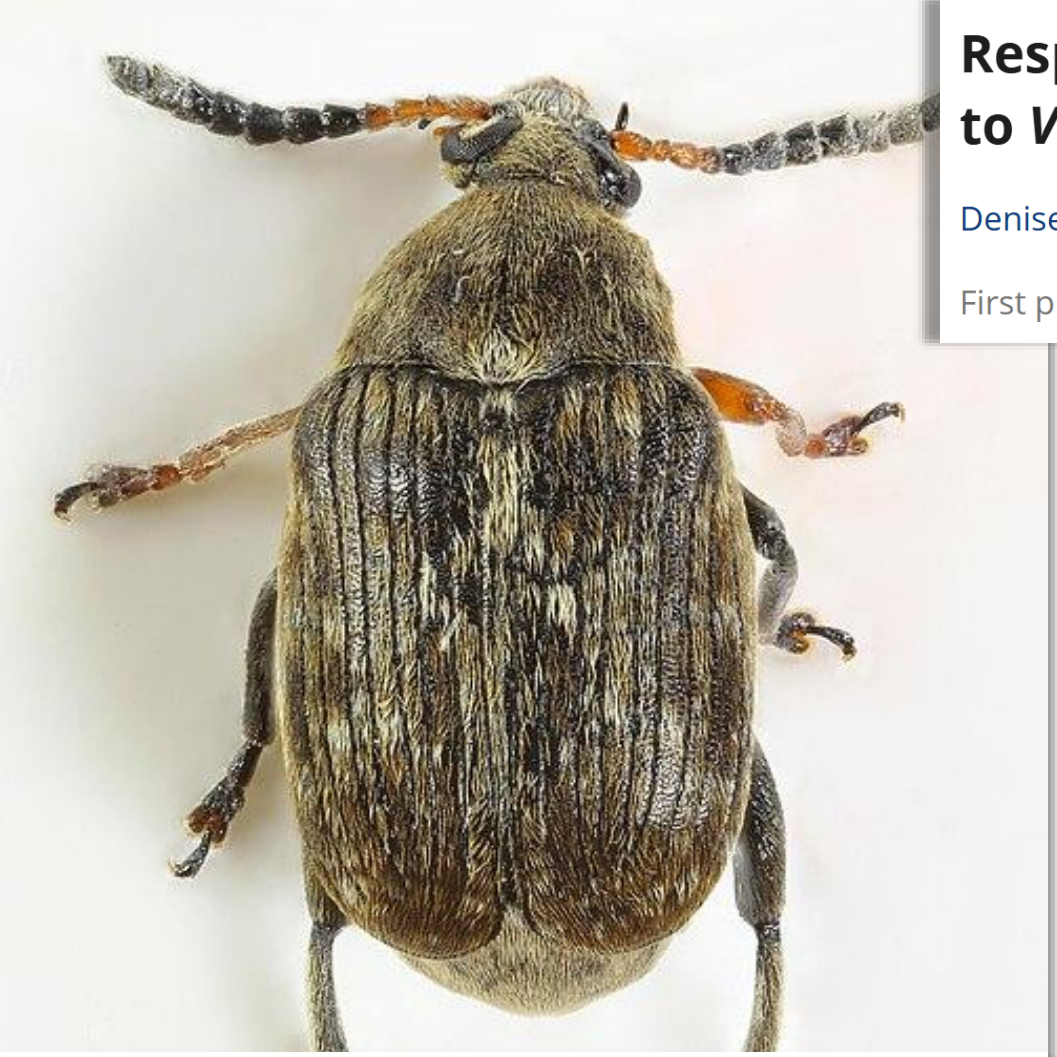
Thomas Pickardt, Martin Meixner, Verena Schade & Otto Schieder

Transformation of *Vicia narbonensis* via *Agrobacterium*-mediated gene transfer

Published: February 1991

Volume 9, pages 535–538, (1991) Cite this article

... and further issues that remain unresolved or very difficult to tackle

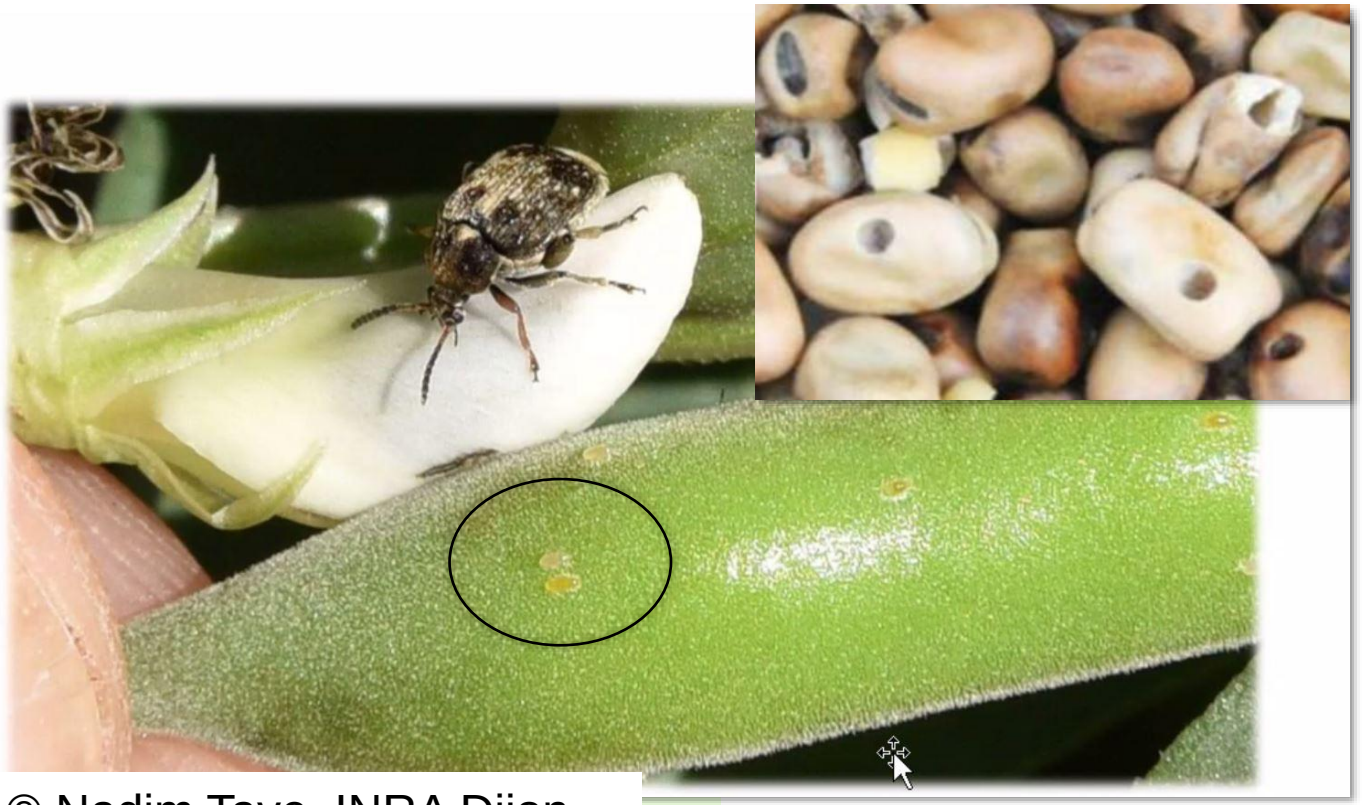


Bruchus rufimanus. Minera, North Wales, May 2017 (Janet Graham)

Responsiveness of the broad bean weevil, *Bruchus rufimanus*, to *Vicia faba* genotypes

Denise Dalbosco Dell'Aglio ✉, Nadim Tayeh

First published: 20 January 2023 | https://doi.org/10.1111/eea.13277 | Citations: 12



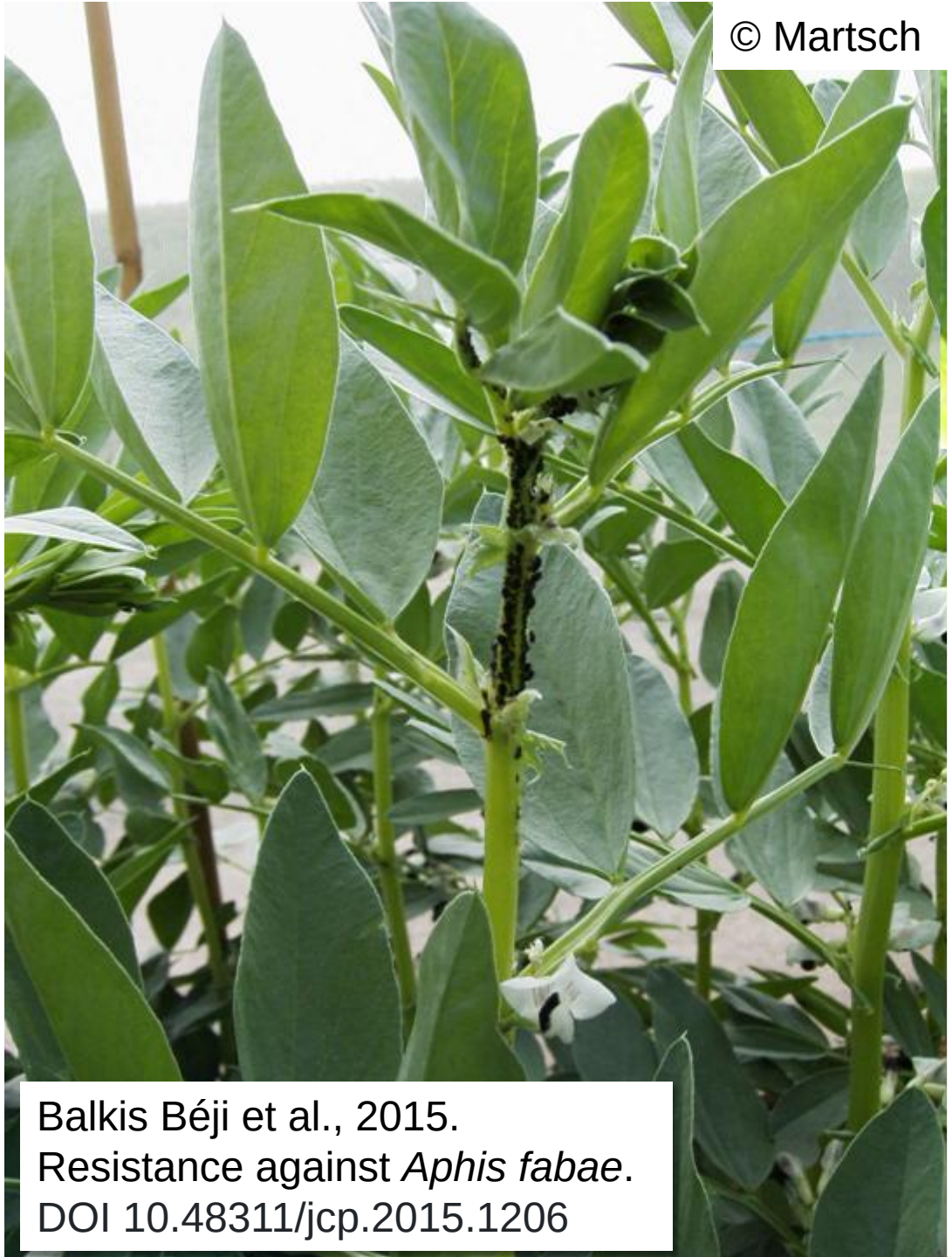
© Nadim Taye, INRA Dijon

From ProFaba-Project. The accessions “DVF1977|221516/INRA” (15.56%), “ILB 793” (18.78%), “4172” (20.11%) and “BOBICK ROD115” (21%) showed the best and most stable performance in the different environments
DOI 10.3389/fpls.2018.01914

Sitona lineatus; pea leaf weevil; Blattrandkäfer (“leaf-edge beetle”)

https://www.inaturalist.org/photos/294670411.
Поляков Александр

The beetle feeds from leaves, see symptoms. Beetle and larve transfer viruses from plant to plant. The larvae live in the soil at the plant roots. They feed from roots and nodules, the injuries are entrances for soil-borne fungi.



© Martsch

Balkis Béji et al., 2015.
Resistance against *Aphis fabae*.
DOI 10.48311/jcp.2015.1206

Resistance against *Aphis fabae*?
Hard to find useful genetic differences, complicated traits to work with.

ORIGINAL ARTICLE | Open Access

Reproductive potential of the black bean aphid (*Aphis fabae* Scop.) on a range of faba bean (*Vicia faba* L.) accessions

Henrik Skovgård, Frederick L. Stoddard

First published: 25 May 2023 | https://doi.org/10.1002/leg3.199 | Citations: 10

ILB938 not only with Botrytis resistance and aberrant stipula spot feature, but as well with promising reaction towards aphids?

"... strong performance of ILB938/2 against the black bean aphid... factors rendering it unconducive to aphid landing, feeding, and/or reproduction ...

Orobanche crenata and *Orobanche foetida* are devastating parasitic plants in the Mediterranean area and climates. Farmers are often forced to abandon crops such as faba bean, chickpea, pea, carrots, tomato, sunflower and others.

Drought exacerbates the effect of *Orobanche*. *Orobanche* seed is extremely small, like dust, keeps germination ability in soil decades-long.

Default control is herbicide. Low-dose to be not-really-harmful for the crop but kill the *Orobanche*. A delicate, difficult approach and motivation for herbicide-resistance work in faba bean.

Orobanche, *Bohnenwürger*. With ChatGPT.

Metribuzin (Sencor)
Glyphosate (Round Up)

Article | Open access | Published: 07 January 2022

Genomic regions associated with herbicide tolerance in a worldwide faba bean (*Vicia faba* L.) collection

Lynn Abou-Khater ✉, Fouad Maalouf ✉, Abdulqader Jighly, Alsamman M. Alsamman, Diego Rubiales, Nicolas Rispail, Jinguo Hu, Yu Ma, Rind Balech, Aladdin Hamwieh, Michael Baum & Shiv Kumar

Nematol. medit. (2001), 29: 29-33

INRA, Programme Fourrages, BP. 6570, Rabat Instituts, 10101 Rabat, Morocco

SCREENING OF *VICIA FABA* FOR RESISTANCE TO THE "GIANT RACE" OF *DITYLENCHUS DIPSACI* IN MOROCCO

by

F. ABBAD ANDALOUSSI

Nematodes? Under-researched, neglected?

Traditional faba bean viruses.

Bean yellow mosaic virus.	Transmitted by aphids.
Bean leaf roll virus.	Transmitted by aphids.
Faba bean necrotic yellow virus.	Transmitted by aphids.

Broad bean true mosaic virus	Transmitted by *Sitona* and via seed
Borad bean stain virus	Transmitted by *Sitona* nad via seed

Die Virusepidemie an Leguminosen 2016 – eine Folge des Klimawandels?

The virus epidemic on legumes 2016 – an effect of climate change?

Heiko Ziebell

Institut

Julius Kühn-Institut – Bundesforschungsinstitut für Kulturpflanzen, Institut für Epidemiologie und Pathogendiagnostik, Braunschweig

Journal für Kulturpflanzen, 69 (2). S. 64–68, 2017, ISSN 1867-0911, DOI: 10.1399/JfK.2017.02.09, Verlag Eugen Ulmer KG, Stuttgart

FBNYV/FBNSV

Nanovirus

Sie haben diese Nachricht am 05.08.2016 11:21 weitergeleitet.

Von: Ziebell, Heiko <heiko.ziebell@julius-kuehn.de>
An: Link, Wolfgang
Cc: Martsch, Regina; Bruenjes, Lisa; Siebrecht, Daniel
Betreff: AW: nesterweise heftige häufige Virussymptome Ackerbohnen

Institut für Epidemiologie und Pathogendiagnostik
Julius Kühn-Institut,
Bundesforschungsinstitut für Kulturpflanzen
Messeweg 11-12
38104 Braunschweig, Germany
Tel.: (+49)-531-299-3802
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NEU:
E-mail: heiko.ziebell@julius-kuehn.de
Internet: www.julius-kuehn.de

Epidemic in 2016

Proben-Nummer	Datum	Herkunft	Sorte/Akzession	FBNYV/FBNSV Nanovirus Mix1	FBNYV/FBNSV Nanovirus Mix2	TuYV (BWYV 2-5G4)	BLRV (4 6G4)	PEMV QLB ,AS 180									
HZ 16-117	07.07.2016	Universität Göttingen,	Ackerbohne Vicia faba	-	+	-	-	+	-	-	-	-	-				
HZ 16-118	07.07.2016	Universität Göttingen,	Ackerbohne Vicia faba	-	+	+	+	+	-	-	-	-	-				
HZ 16-119	07.07.2016	Universität Göttingen,	Ackerbohne Vicia faba	-	+	-	-	+	-	-	-	-	-				
HZ 16-120	07.07.2016	Universität Göttingen,	Ackerbohne Vicia faba	-	+	-	+	+	-	-	-	-	-				
HZ 16-121	07.07.2016	Universität Göttingen,	Ackerbohne Vicia faba	-	+	-	-	+	-	-	-	-	-				
HZ 16-122	07.07.2016	Universität Göttingen,	Ackerbohne Vicia faba	-	+	-											

FBNYV/FBNSV Nanovirus Mix2

Extreme nanovirus calamity in 2016

Heiko Ziebell

PhD, Dipl.-Ing. agr. · Scientific Director at Julius Kühn-Institut

Sortenübersicht

Sortenbezeichnung	Tanningehalt	Hauptfruchtanbau: Blühbeginn	Reife	Pflanzenlänge	Neigung zu Lager	Anfälligkeit für: Ascochyta	Botrytis	Rost	Ertrags- und Qualitätseigenschaften: Tausendkornmasse	Kornertrag	Rohproteinertrag	Rohproteingehalt
Ackerbohne *(Vicia faba* L. *(partim))*												
In Frühjahrsaussaat geprüft												
Mit Voraussetzung des landeskulturellen Wertes in Deutschland zugelassen												
Allison [1)]	9	4	5	5	2	5	4	4	6	6	7	4
Bianca [1)]	1	-	-	-	-	-	-	-	-	-	-	-
Birgit	9	4	5	6	3	-	-	5	6	7	8	5
Bolivia [1)]	9	-	-	-	-	-	-	-	-	-	-	-
Fanfare	9	4	5	6	2	5	4	5	6	6	7	4
Fuego	9	4	5	5	-	-	-	-	6	5	6	4
Futura [1)]	9	4	5	6	3	5	4	5	6	7	8	4
Genius	9	5	5	6	2	5	4	6	6	7	7	3
Hammer [1)]	9	4	5	6	2	5	4	5	6	8	8	4
Iron [1)]	9	4	5	6	2	5	4	4	7	7	8	4
Isabell	9	-	-	-	-	-	-	-	-	-	-	-
neu Ketu [1)]	9	5	5	6	2	-	-	-	6	7	8	5
LG Eagle	9	5	5	6	1	-	4	5	7	7	7	4
LG Viper	9	5	5	5	1	-	-	4	6	5	7	5
neu Loki	9	5	5	6	1	-	-	-	6	8	6	1
Macho	9	5	5	6	2	5	4	4	8	7	7	3
Tiffany [1)]	9	4	5	6	2	5	4	5	6	6	7	5
Trumpet	9	5	5	6	1	5	4	6	4	6	7	3

[1]low in vicine

Sortenübersicht

Sortenbezeichnung	Tanningehalt	Hauptfruchtanbau: Blühbeginn	Blühdauer	Reife	Pflanzenlänge	Neigung zu: Auswinterung	Lager	Ertrags- und Qualitätseigenschaften: Tausendkornmasse	Kornertrag	Rohproteinertrag	Rohproteingehalt
Ackerbohne *(Vicia faba* L. *(partim))*											
In Herbstaussaat geprüft											
Mit Voraussetzung des landeskulturellen Wertes in Deutschland zugelassen											
Augusta	9	5	4	5	4	-	-	5	+)	-	5
GL Arabella	9	4	5	4	4	-	-	4	+)	-	5

Beschreibende Sortenliste, BSA Hannover 2025
Descriptive List of cultivars, BSA Hannover 2025

The list of desired progress is long. Nevertheless: Breeders did a great job, especially after 1983; after modernisation of growth type (... Minica, Alfred and successors; cf. 'EC Joint Faba Bean Trials', Dantuma et al., 1983).

“With my partial allogamy, the breeding methods appropriate for me, the faba bean, are general solutions of which the methods for self-fertilizing and cross-fertilizing crops are just marginal cases.”

So: Several topics are kind of solved or at least not so hard to gradually improve and gradually solve.

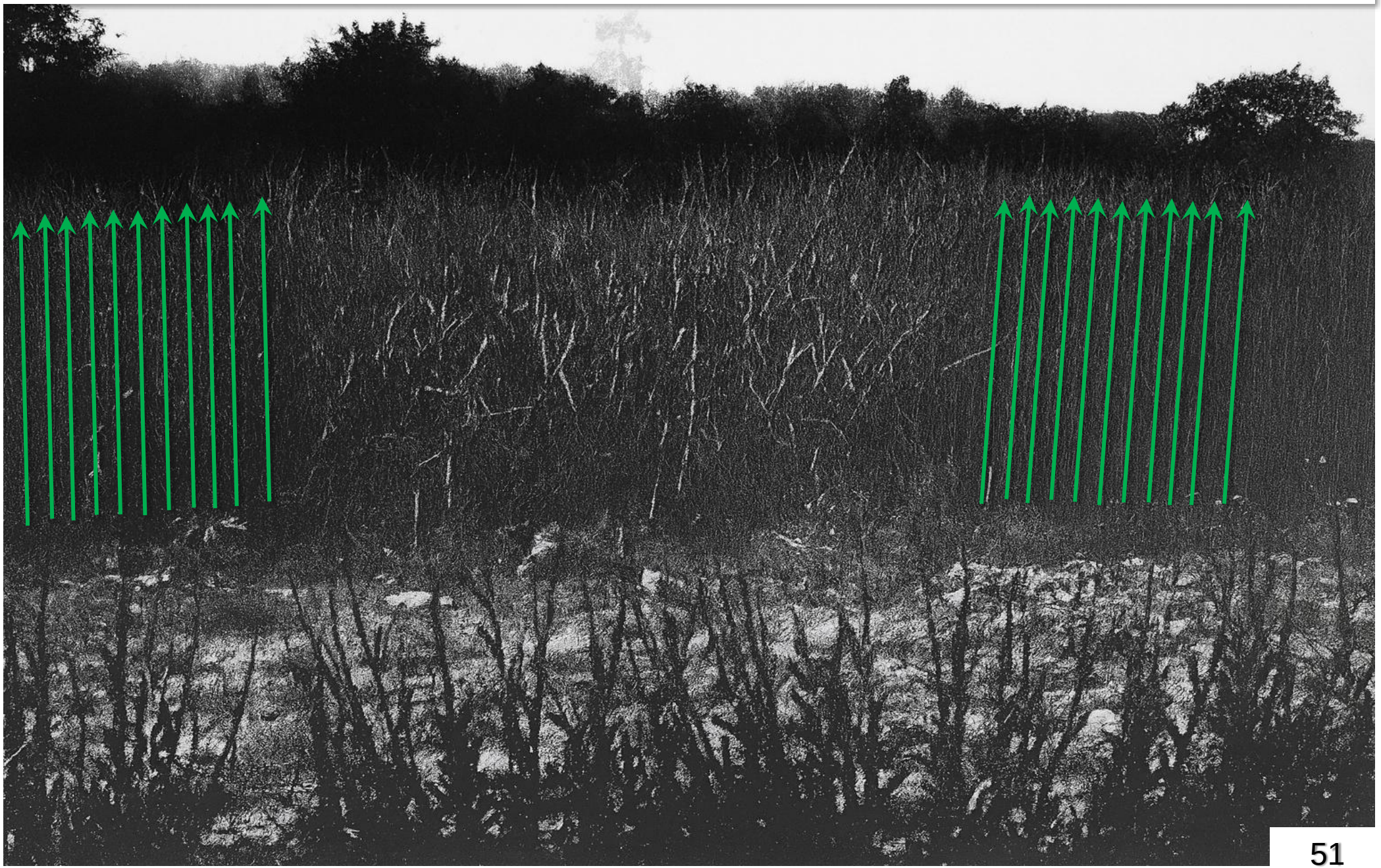
- Alternative morphology-anatomy
- Synchronous maturity straw-leaves-pod-seed
- Seed protein content
- Zero tannin
- Low vicine-convine
- Only for few fungi and other pathogens and pest we have good support for resistance breeding by genetic data and useful genetic variation.

Stabil-Typ. O. Sass, Dissertation 1988. Monogenic recessive © Sass

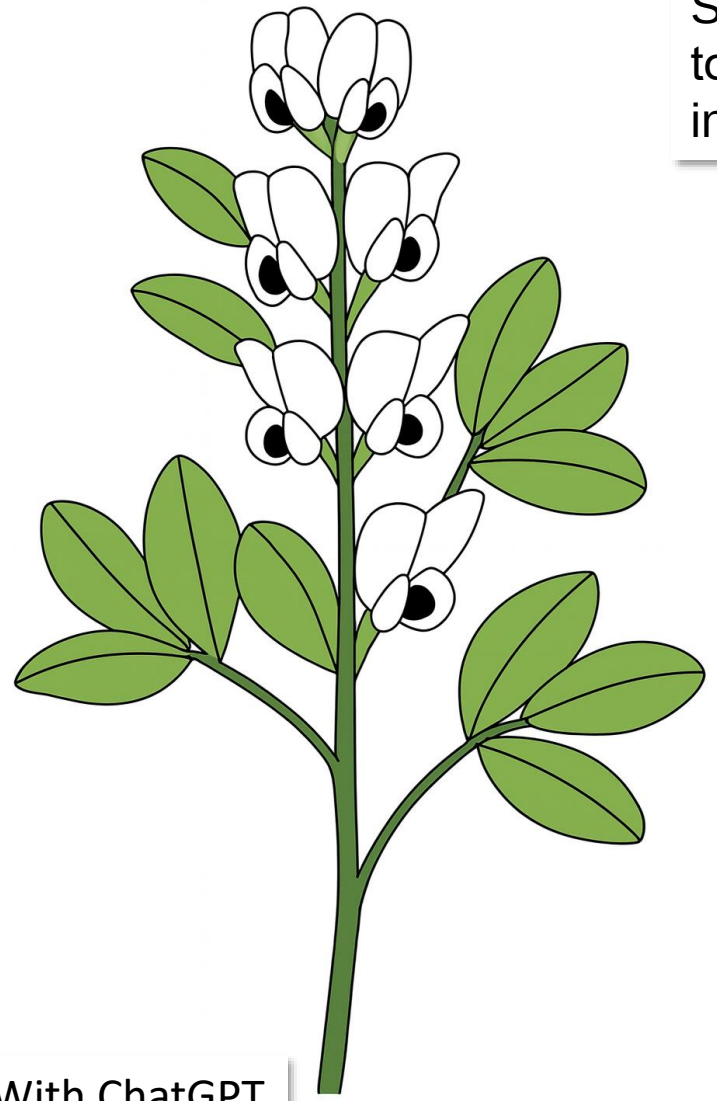
‘Stabile Type’

Extremely non-lodging type.

Has been represented *via* cultivars ‘Boss’ and ‘Mythos’.



Sjödin, 1971. Induced morphological variation in *Vicia faba* L. Hereditas. 1971;67:155–79.
Khazaei et al., 2024. The Jan Sjödin faba bean mutant collection: morphological and molecular characterization. DOI /10.1186/s41065-024-00339-7.



With ChatGPT

Sketch of so-called topless, aka ‘terminal inflorescence; ti’.

Represented *via* cvs. Tifaba, Tinova, Tina ...

So-called topless cultivars were more often used in the former GDR than in the BRD. They follow, obviously, the cereal philosophy: End vertical growth with the reproductive organs, flowers, fruits, seed. Yet, these ‘ti’ type faba beans showed late tiller production (no vegetative apex hence no apical dominance) and their better resistance to lodging was less convincing than expected.

Stem and pods and seed must be mature and dry and ready for combine-harvest in the same time: Synchronous Maturity. Breeders solved this without much adamic input.

Photo shows asynchronous maturing faba bean plants.

https://llh.hessen.de/pflanze/marktfruchtbau/versuchswesen-marktfruchtbau/lsv-koernererbsen-und-ackerbohnen-2020-empfehlungen-2021/

Such synchronous maturity was no big topic before the use of combine harvest. The cut bean crop was put into windrows („*auf Schwad gelegt*“) and only threshed (in-door) after this brut-force ripening.

Today we cut-and-thresh in one go: „Combine harvest“.
The cultivar Herz Freya was the first one to combine a reasonable synchronous maturity.

Stem and pods and seed must be mature and dry and ready for combine-harvest in the same time: Synchronous Maturity. Breeders solved this without much adamic input.

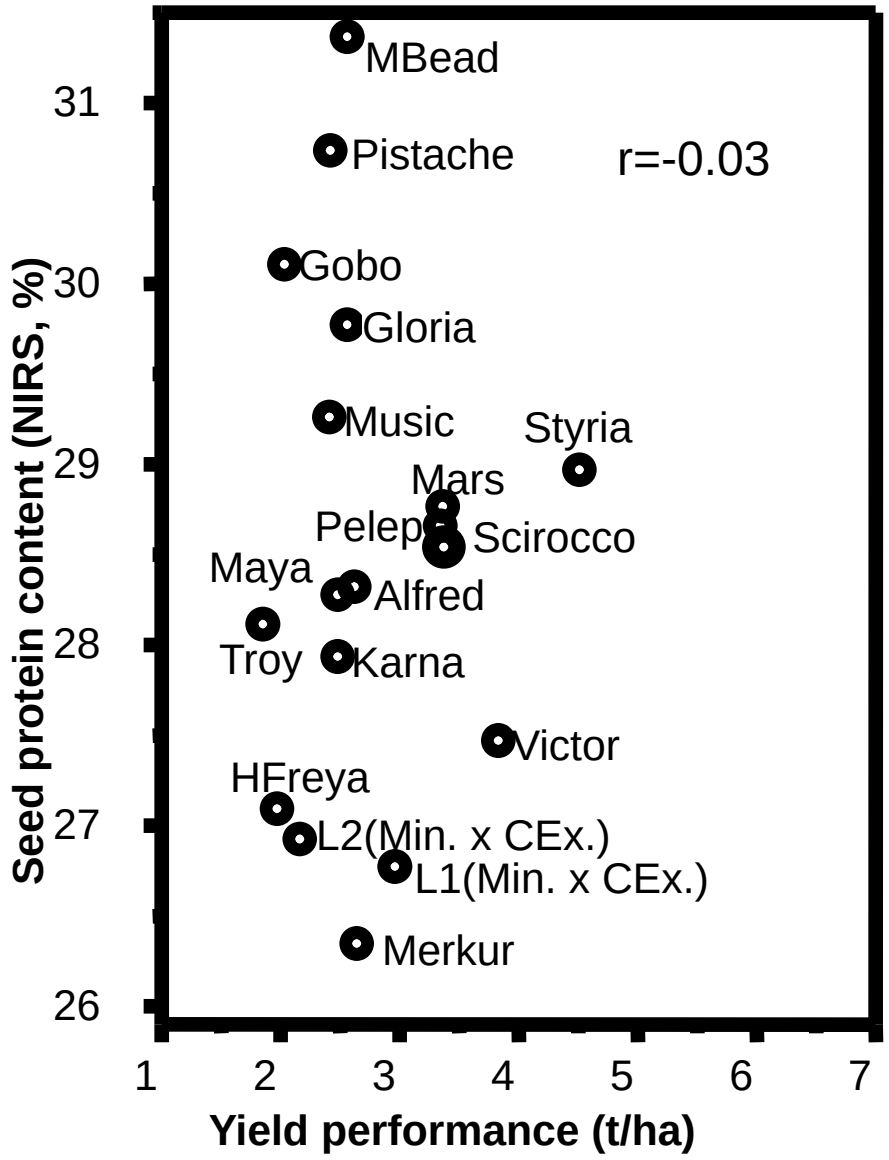
https://llh.hessen.de/pflanze/marktfruchtbau/versuchswesen-marktfruchtbau/lsv-koernererbsen-und-ackerbohnen-2020-empfehlungen-2021/

Such synchronous maturity was not big topic before the use of combine harvest. The cut bean crop was put into windrows („*auf Schwad gelegt*“) and only threshed (in-door) after this brut-force ripening.

Today we cut-and-thresh in one go: „Combine harvest“.
The cultivar Herz Freya was the first one to combine a reasonable synchronous maturity.

Non-shattering is another issue.
The monogenic wrinkled pod type is non-shattering but not useful for our climate.

DOI 10.1007/978-3-030-23400-3_7



Zeid et al., 2004

Faba bean protein

Fractionation in air flow
https://d-nb.info/1030359032/34)

Molecular heterogeneity and genetics of *Vicia faba* seed storage proteins

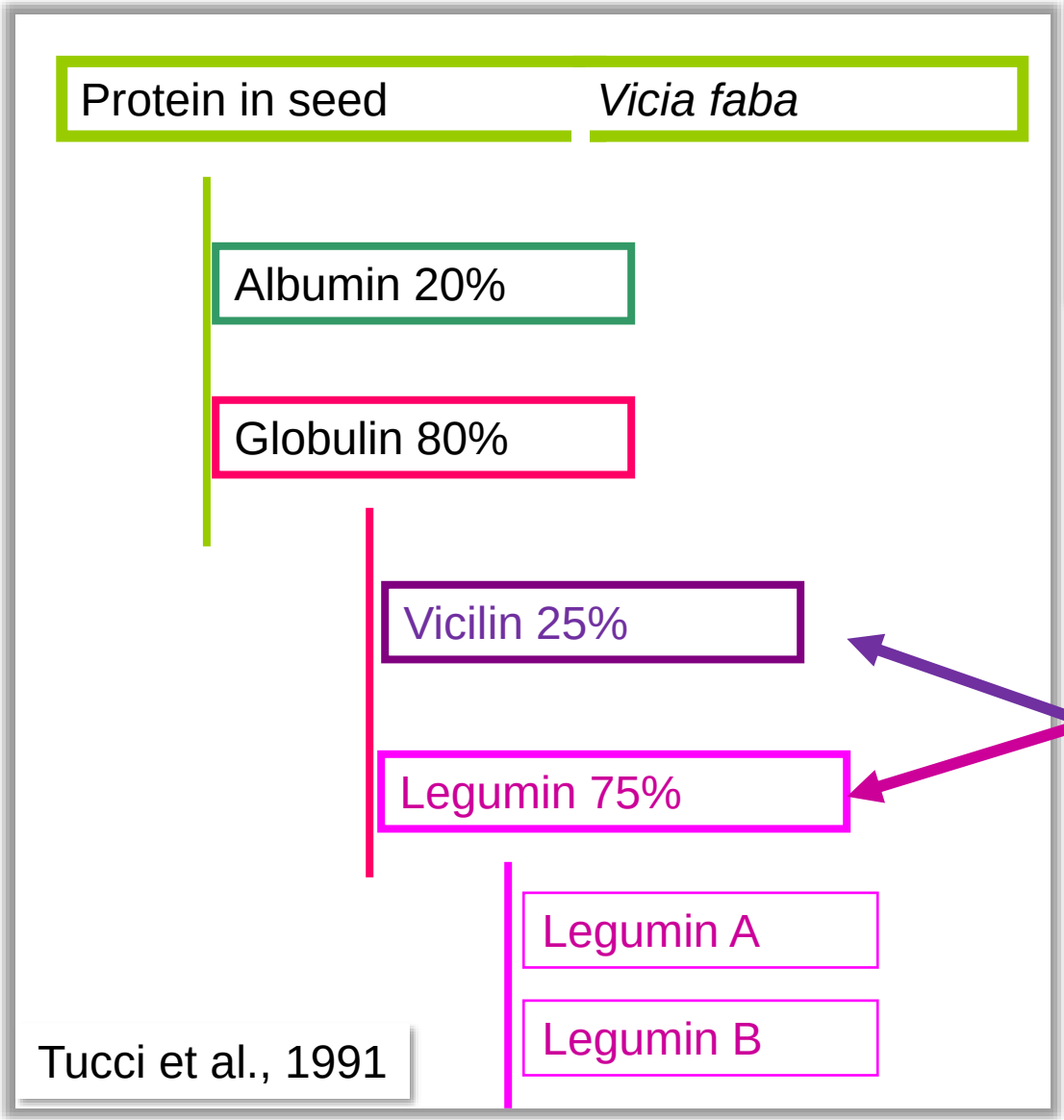
Univ. of Naples, Portici, Italy.

M. Tucci [1], R. Capparelli [2], A. Costa [3] and R. Rao [1,*]

Theor Appl Genet (1991) 81:50–58

Low content of S-containing AA Methionine and Cystein limit *V. faba* protein quality.

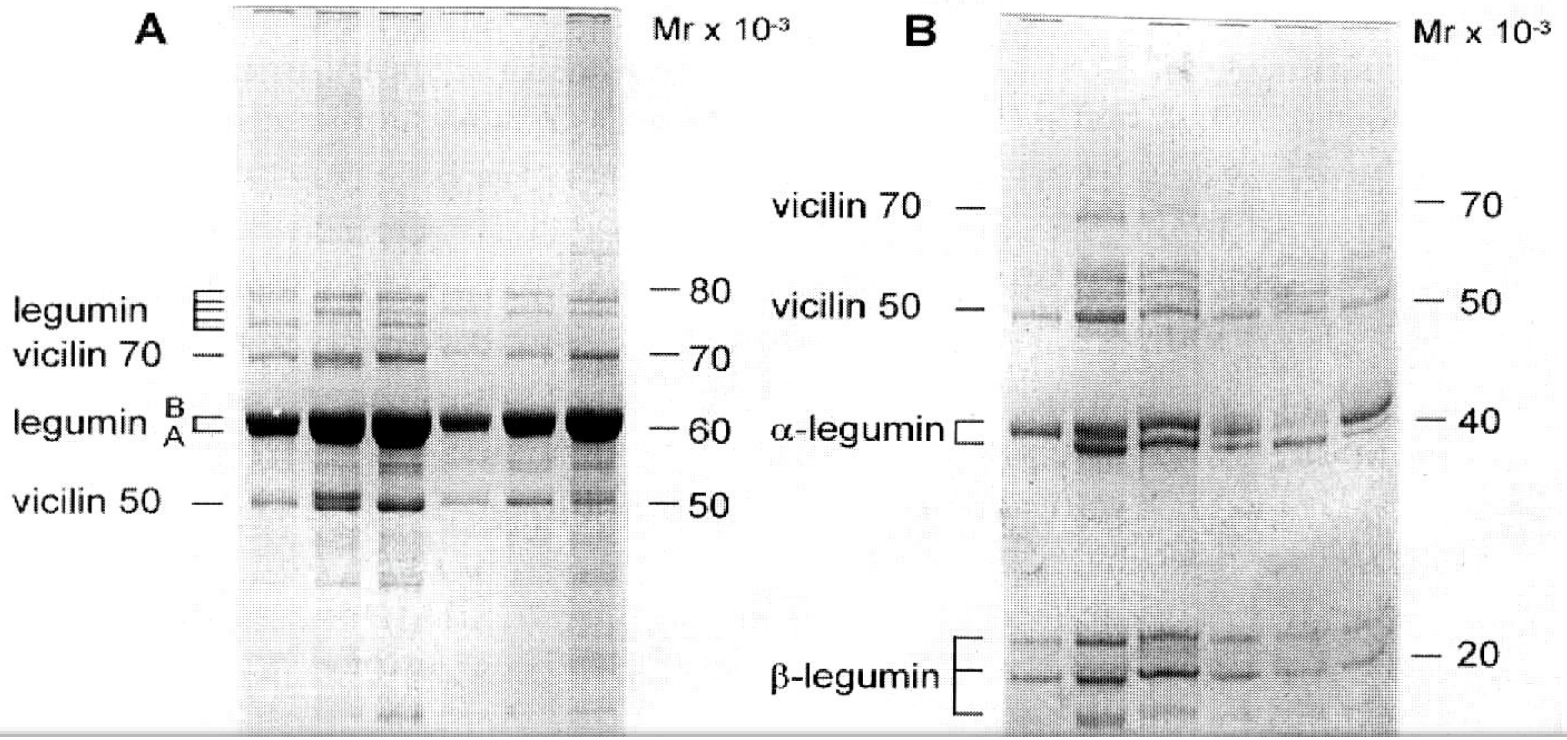
ChatGPT ‚hallucinates' a protein product from faba bean seed for human consumption



The ratio of **legumin** to **vicilin** in field beans varies between genotypes, e.g. from 1 : 1.7 to 1 : 2.3 (Mårtenson, 1980)

The S content of **legumin** is at least twice as high as that of **vicilin**

SDS-Page Variability of Globulin (Shewry und Casey 1999)
Interestingly, protein sub-fractions may be breeding objectives and genetic markers.



Journal of Agricultural and Food Chemistry > Vol 70/Issue 30 > Article

Open Access

AGRICULTURAL AND ENVIRONMENTAL CHEMISTRY | July 21, 2022

Seed Development and Protein Accumulation Patterns in Faba Bean (*Vicia faba*, L.)

Ahmed O. Warsame*, Nicholas Michael, Donal M. O'Sullivan, and Paola Tosi

Zero tannin. No big deal to breed for it. Nevertheless, current cultivars are wild-type.

Tannins are like ‘natural seed treatment’, protect against fungal attack during germination (*Fusarium* sp.)

Tannins have positive and negative impact, depending on animal species and age. They lower protein digestibility and chelate particularly with iron, which may decrease mineral absorption in the gastrointestinal tract and can increases risk of mineral deficiencies. Cormack et al., 2025. DOI 10.1080/10408398.2025.2568600

Tannin-free seed.
Light and greyish testa colour

Tannin-containing testa.
‚Beige', buff-colour.
Mostly darkening in store.

Picard, J. (1976) Aperçu sur l'hérédité du caractère absence de tanins dans les grains de féverole (*Vicia faba* L.). *Annales de l'Amélioration des Plantes* **26**, 101–106. [A translation, from French to English, of *Picard, J. (1976)* is available from the corresponding author (No 1).]

Potential seed multiplication problems arising from the existence of two genes for the absence of tannin in *Vicia faba* L. *Plant Varieties and Seeds* (2000) **13**, 131–139

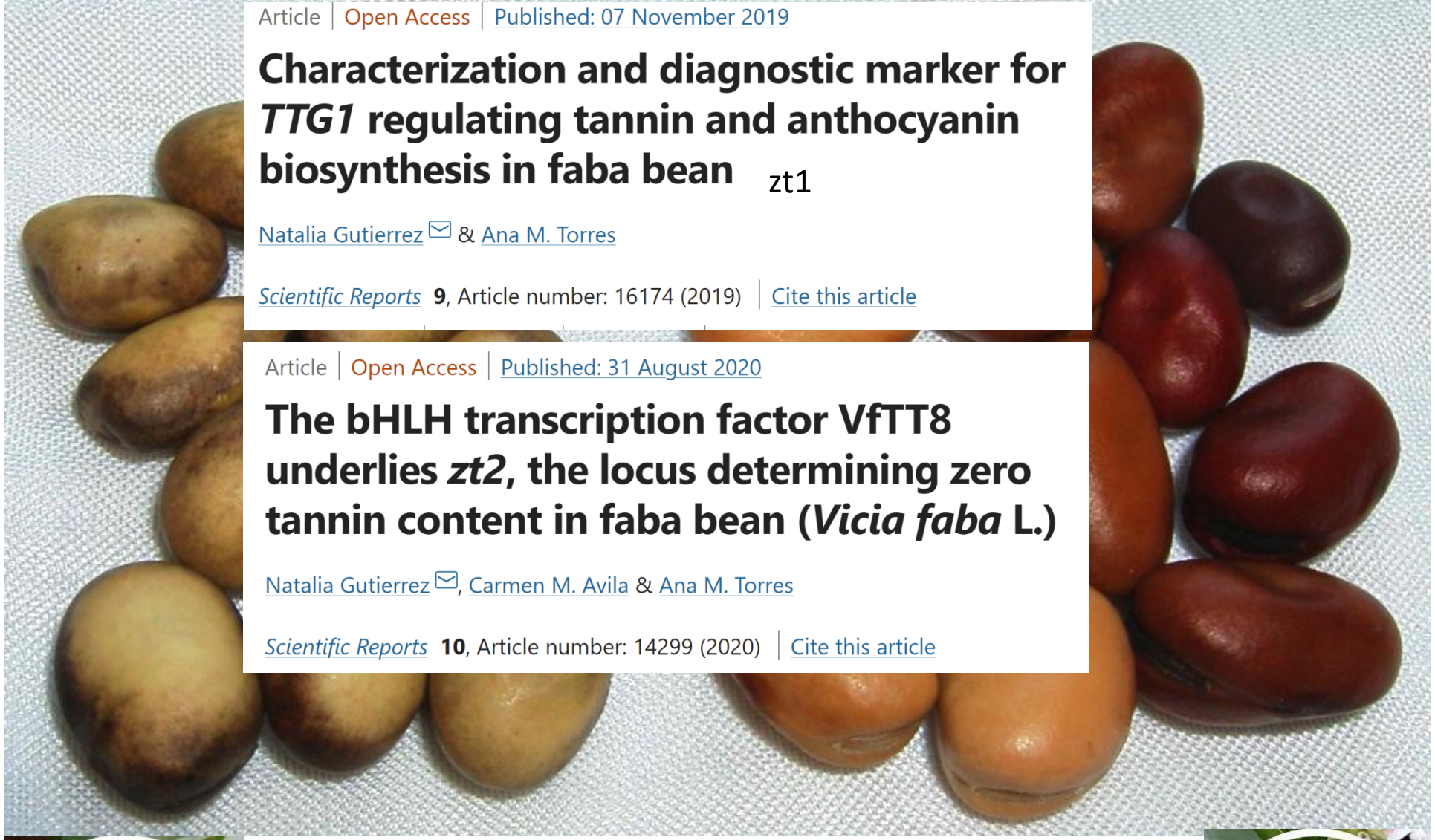
G.R.A. CROFTON[1], D.A. BOND[2] and G. DUC[3] [1]*24 Hinton Way, Great Shelford, Cambridge, CB2 5BE, UK;* [2]*16 Priam's Way, Stapleford, Cambridge, CB2 5DT, UK;* [3]*INRA, Unité de Génétique et Amélioration des Plantes BV1540, 21034, Dijon, Cedex, France*

zt1,zt1:zt2,zt2

"The double recessive genotype, zt1,zt1:zt2,zt2 is thought to be lethal."

Hard to validate via χ^2 tests.

With markers for these two loci, this statement should be easy to validate ...



Article | Open Access | Published: 07 November 2019

Characterization and diagnostic marker for *TTG1* regulating tannin and anthocyanin biosynthesis in faba bean zt1

Natalia Gutierrez & Ana M. Torres

Scientific Reports **9**, Article number: 16174 (2019) | Cite this article

Article | Open Access | Published: 31 August 2020

The bHLH transcription factor VfTT8 underlies *zt2*, the locus determining zero tannin content in faba bean (*Vicia faba* L.)

Natalia Gutierrez, Carmen M. Avila & Ana M. Torres

Scientific Reports **10**, Article number: 14299 (2020) | Cite this article

Tannin-free seed.
Light and greyish testa colour

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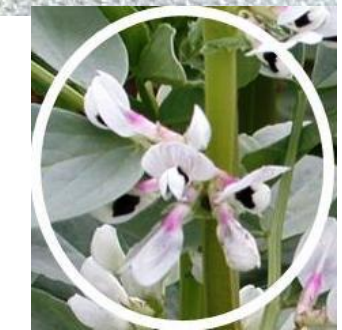


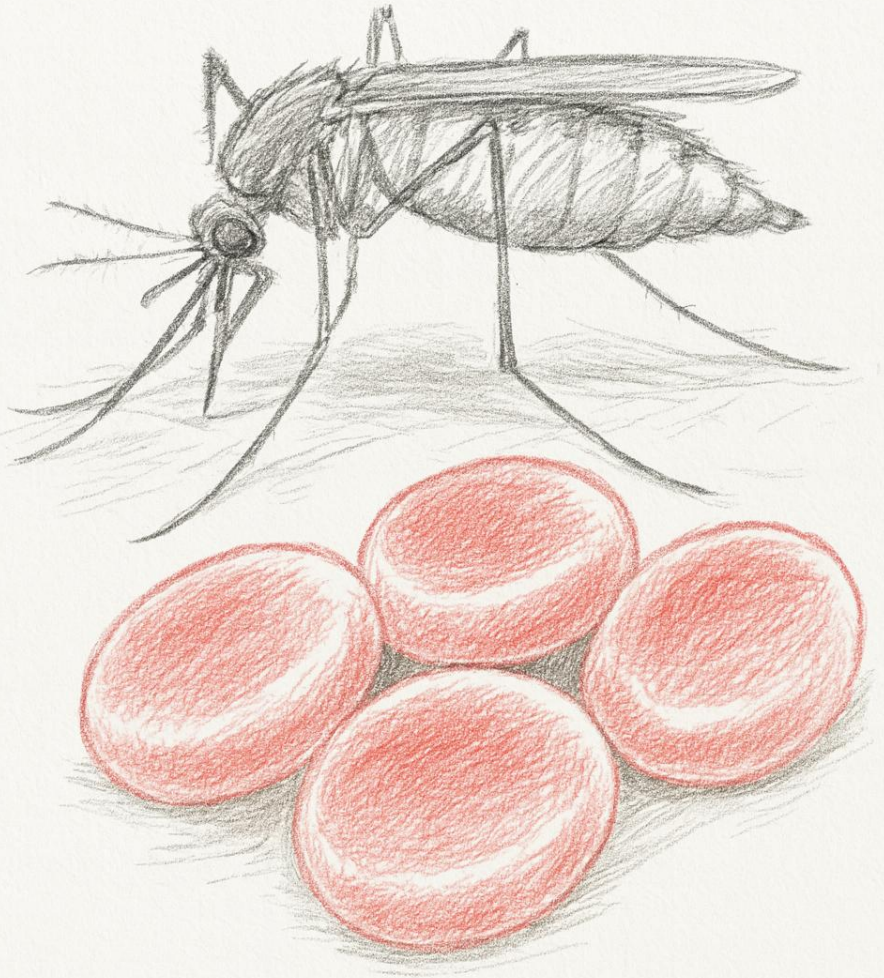
Low vicine–convicine and zero tannin 'FEVITA' faba beans

Fevita, des féveroles sans tannins et à basse teneur en vicine–convicine

by Paolo ARESE*, Gérard DUC**, Michel LESSIRE***, Pascal MARGET**

GRAIN LEGUMES No. 48 – January 2007

Vicine-convicine in faba bean



Mosquito and red blood cells visualize the topic of this page (with ChatGPT)

Natural selection of hemi- and heterozygotes for G6PD deficiency in Africa by resistance to severe malaria

C. Ruwende*, S. C. Khoo†, R. W. Snow‡, S. N. R. Yates*, D. Kwiatkowski†§, S. Gupta‖, P. Warn†‡, C. E. M. Allsopp†, S. C. Gilbert*, N. Peschu‡, C. I. Newbold†, B. M. Greenwood§, K. Marsh‡ & A. V. S. Hill*†¶

NATURE · VOL 376 · 20 JULY 1995

No red blood cell damage and no hemolysis in G6PD-deficient subjects after ingestion of low vicine/convicine *Vicia faba* seeds

Paolo Arese

Valentina Gallo,[1] Oleksii A. Skorokhod,[1] Luigi Felice Simula,[2] Tiziana Marrocco,[1] Elisa Tambini,[1] Evelin Schwarzer,[1] Pascal Marget,[3] Gérard Duc,[3] and Paolo Arese[1]

blood® 5 APRIL 2018 | VOLUME 131, NUMBER 14 **1621**

Das, A.K. and N.K. Majumder, 2008: Heterogeneity of the **glucose-6-phosphate dehydrogenase** enzyme in Indian **buffaloes**. Buffalo Bulletin 27, 2008, 181-183.

No connection of G6PD variation with hemic parasites mentioned in this manuscript

Seemingly, *Homo sapiens* shares some aspects of G6PD and *Malaria falciparum* with ‚other' animals.

Noteworthy: Glutathione:is a Tripeptide composed of the AA Glutamic acid, **Cysteine** and Glycine. Cysteine is in low content in faba bean protein … ;-)

Paglia, D.E., 2006: Acute episodic hemolysis in the African black **rhinoceros** as an analogue of human **glucose-6-phosphate** dehydrogenase deficiency. American Journal of Hematology 42, 36 – 45.

Sudden episodes of massive haemolysis have become the most common cause of death among captive black **rhinoceroses**, and there is evidence that they occur in the wild as well. We have observed … marked deficiencies of intracellular … **glutathione** cycling. It is proposed that erythrocyte … deficiency in rhinoceroses may be an evolutionary adaptation conferring selective advantage against **common hemic parasites**, comparable to the rôle of **human glucose-6-phosphate dehydrogenase (G-6-PD) deficiency in *falciparum* malaria**.

nature plants

LETTERS

https://doi.org/10.1038/s41477-021-00950-w

Check for updates

VC1 catalyses a key step in the biosynthesis of vicine in faba bean

2021

Emilie Björnsdotter[1,10], Marcin Nadzieja[2,10], Wei Chang[3,10], Leandro Escobar-Herrera[2], Davide Mancinotti[1], Deepti Angra[4], Xinxing Xia[1], Rebecca Tacke[5], Hamid Khazaei[6], Christoph Crocoll[7], Albert Vandenberg[6], Wolfgang Link[5], Frederick L. Stoddard[8], Donal M. O'Sullivan[4], Jens Stougaard[2], Alan H. Schulman[3,9] ✉, Stig U. Andersen[2] ✉ and Fernando Geu-Flores[1] ✉

Man behind RIBA1

Fernando Geu-Flores, Copenhagen

ORIGINAL ARTICLE | Open Access

Developmental Stage-Dependent Gene Expression Modulates Maternal Control of Seed Vicine Biosynthesis in Faba Bean

Samson Ugwuanyi ✉, Gerke-Fabian Thomas, Hanna Tietgen, Felix Dreyer, Amine Abbadi, Rod J. Snowdon

First published: 05 November 2025 | https://doi.org/10.1002/leg3.70057

2022

Experimental plot in isolation-in-space (Reinshof, Göttingen); 23 June 2020.

Generation Syn-0. Genetically Vicine-convicine-poor winter field bean lines (‘Abo-Vici’. Tacke 2020)

Received: 29 December 2020 | Revised: 25 February 2021 | Accepted: 17 March 2021

DOI: 10.1111/pbr.12918

ORIGINAL ARTICLE

Plant Breeding WILEY

Genetic study of the resistance of faba bean (*Vicia faba*) against the fungus *Ascochyta fabae* through a genome-wide association analysis

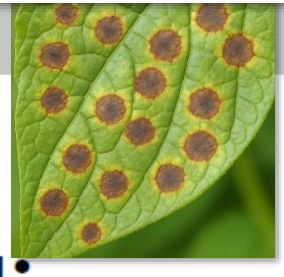
Rabia Faridi[1] | Birger Koopman[2] | Antje Schierholt[1] | Mohamed B. Ali[1,3] | Stefanie Apel[4] | Wolfgang Link[1]

Knowledge and resistance breeding against *Asco-chyta* and *Rust* is rather advanced and doable. Resistance breeding against *Botrytis, Aphids, Bruchus, Sitona* is rather difficult. Relatively little work is done for *Peronospora* and some further fungal pathogens.

Theoretical and Applied Genetics (2022) 135:3735–3756
https://doi.org/10.1007/s00122-021-04022-7

ChatGPT hallucinating fungal disease and black aphid

REVIEW



Advances in disease and pest resistance in faba bean

Diego Rubiales[1] · Hamid Khazaei[2]

Winter Is Coming Alex Windhorst, 2025

© W. Link

AUGUSTA - Neue Winterackerbohne

Am 1. März 2018 wurde für die NPZ die Winterackerbohne AUGUSTA in die deutsche Sortenliste eingetragen.

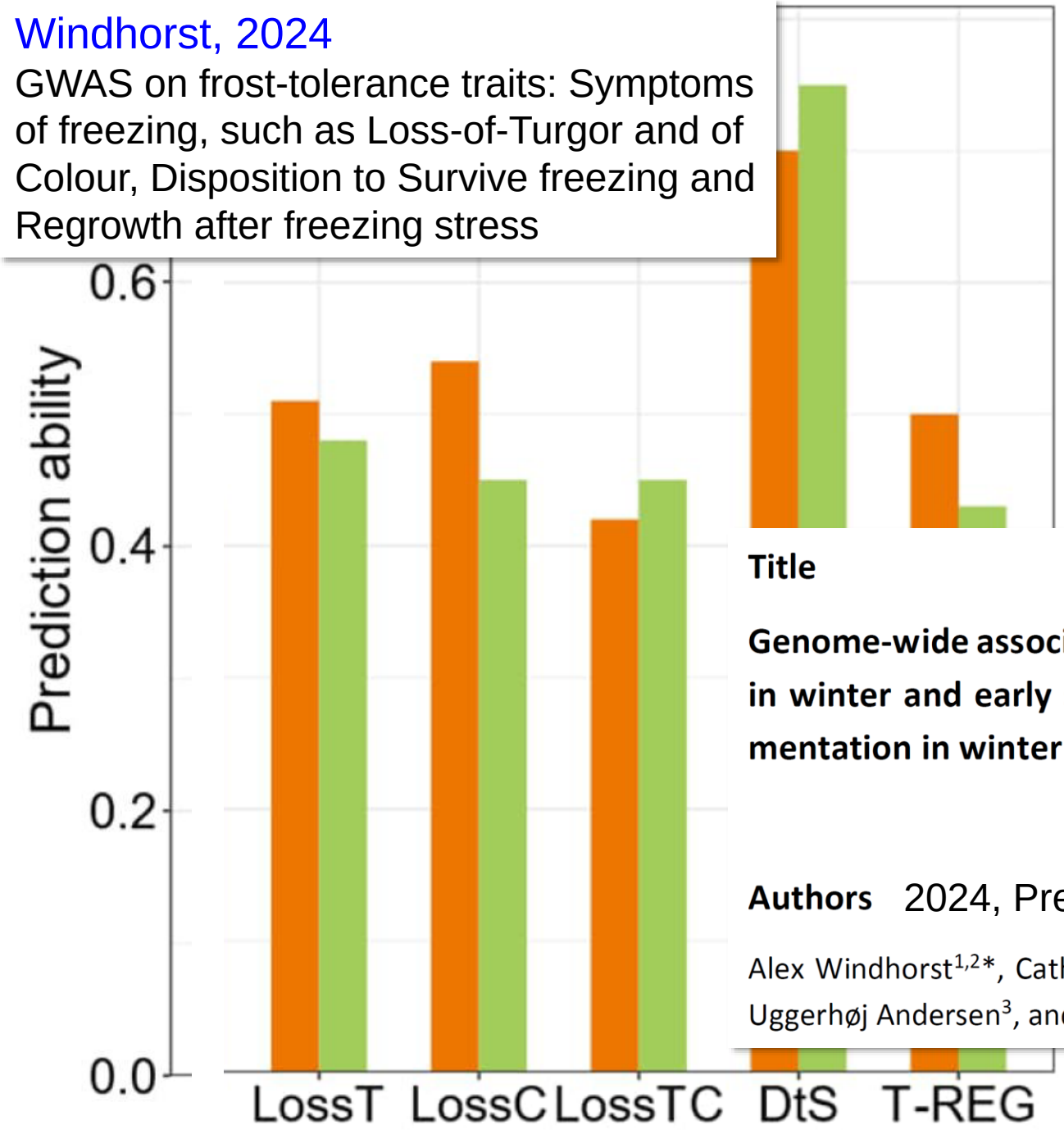
cv. Augusta for autumn sowing was listed in 2018. Hiverna, the only winter bean until then was listed in 1986 (breeder was Harald Littmann, he bred in addition Wibo and Webo).

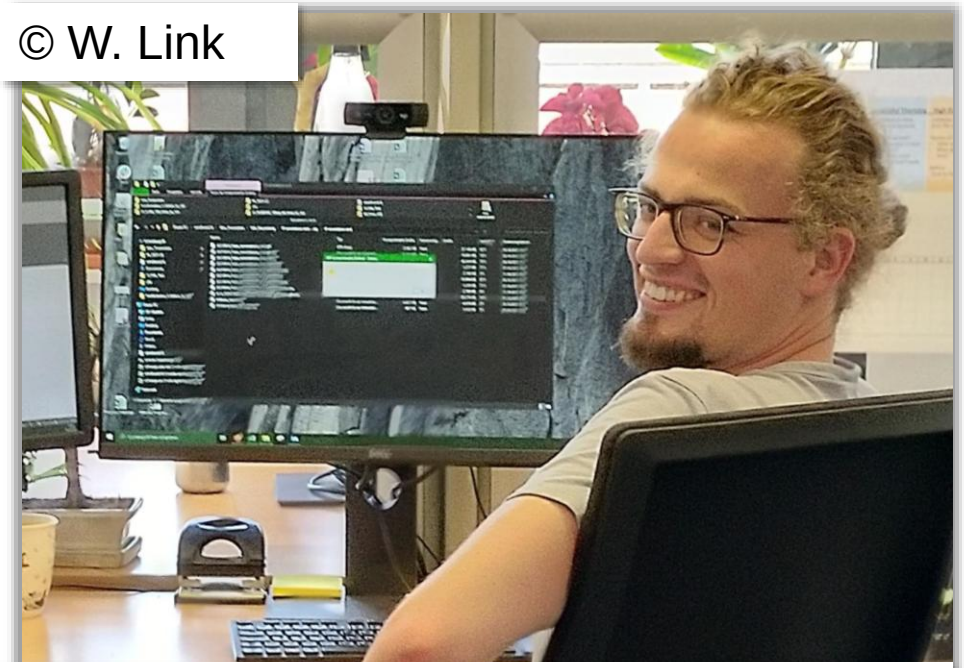
I still think it's great that DNPW at Georg-August University Göttingen was involved in the making of Augusta.
Photo shows a propagation of Syn-0 to Syn-1; my dad and my wife are harvesting.
48.95376555808395, 8.419215851039148

Reinshof. Autumn-sown ProFaba 200 panel, 1 row r=1 per entry. Windhorst, 2024

Windhorst, 2024

GWAS on frost-tolerance traits: Symptoms of freezing, such as Loss-of-Turgor and of Colour, Disposition to Survive freezing and Regrowth after freezing stress





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Title

Genome-wide association studies identify promising QTL for freezing tolerance in winter and early spring as a basis for in-depth genetic analysis and implementation in winter faba bean (*Vicia faba* L.) breeding

Authors 2024, Preprint in BioRxiv

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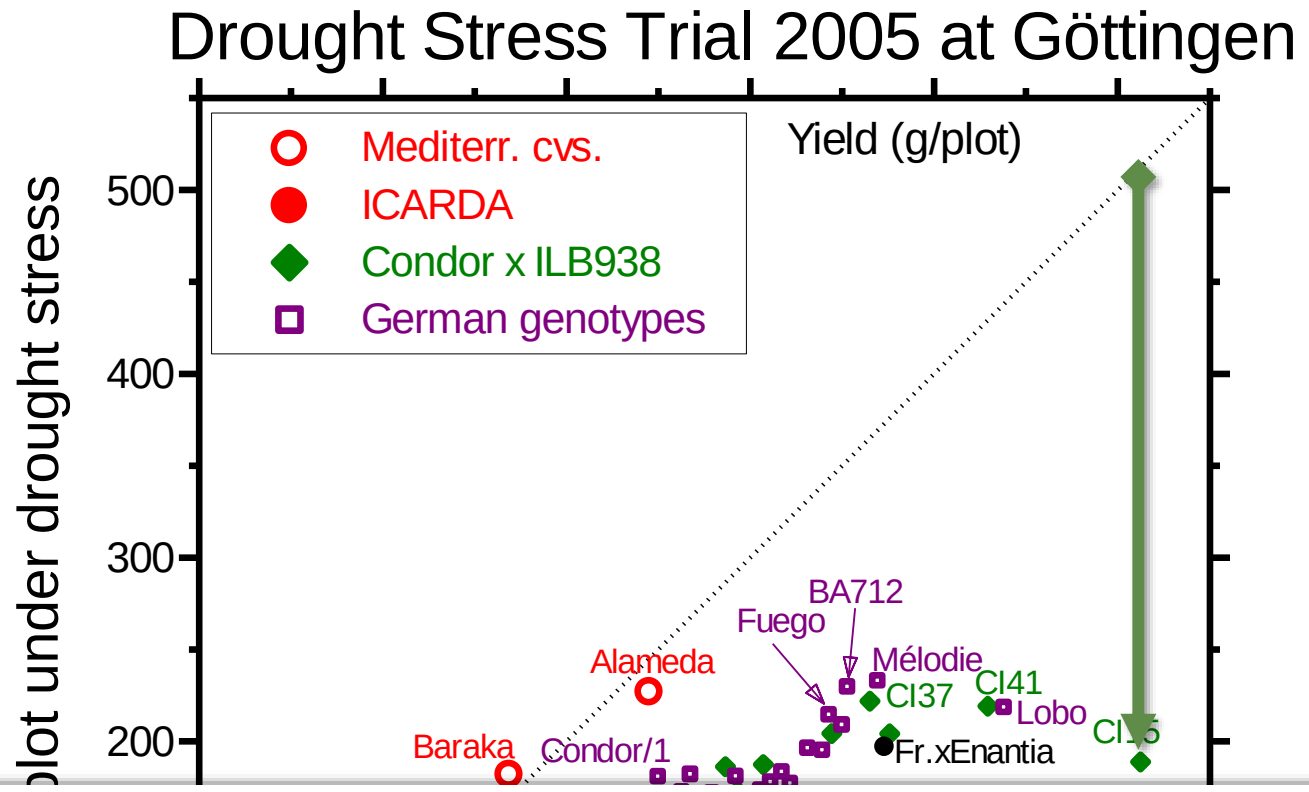
Drought-stress ‘platform’ at Göttingen from 1990 – 2014.

Göttingen, 2013

© W. Link

Groß-Lüsewitz, 2013
© C. Balko



Correlated Responses in Two Traits when Selection is Practised on their Ratio

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Plant Breeding 109, 28—34 (1992)

ISSN 0179-9541

Grain yield ‘well-irrigated’
Grain yield ‘drought’

Association Analyses to Genetically Improve Drought and Freezing Tolerance of Faba Bean (*Vicia faba* L.) 2016

Mohamed B.M. Ali, Gregor C. Welna, Ahmed Sallam, Regina Martsch, Christiane Balko, Björn Gebser, Olaf Sass, Wolfgang Link ✉

Rain-out-Shelter (Trockenstress-Haus) in Göttingen 2025
Project Fabalous
(Coordination: Sarah Schießl-Weidenweber, JLU Giessen)

How do we now arrive at an overall assessment of the situation of *Vicia faba* in D ?

‘My’ comparison between combine-harvested pulses in Germany

Species	Soil demands	Maturity fits	Weed suppr.	Symbiotic perform.	Autochth. Rhizobia	Protein		Option for			Σ
						Con-tent (%)	Qua-lity	Food	Autmn sowing	Hete-rosis	
Soya	**OK**	**NO**	**NO**	**-**	**-**	**>40**	**+**	**YES**	**NO**	**NO**	4
Pea	**OK**	**YES**	**NO**	**+**	**+**	**25**	**-**	**+ / -**	**YES**	**NO**	5
Sweet Lupine (*l/a/a*)	**pH**	**YES**	**NO**	**+**	**+**	**>35**	**+**	**YES**	**NO**	**NO**	6

And now, where to from here?

© Marzinzig

Monogenic-oligogenic features that may be improved in near future.

Genome Editing

► Zero Vicine-Convicine; Resistance against *Bruchus*, *Aphis*, Viruses, *Orobanche*, Herbicides; Autofertile pure lines; No delay in onset of pod growth; No off-flavour in protein fraction. >35% protein content in seed and balanced AA composition ('protein-plus beans'); Zero pod shattering; Zero lodging.

Other topics that are likely to be addressed intensively soon

Hybrid breeding

► CMS and transparent seed coat via Genome Editing. Then: Sowing of TGW ~ 300g and harvesting of TGW ~ 600g (Link et al., 1994. Crop Sci 34, 960-964).

Else

► Winterhardiness sufficient for Central Europe all winters.

► Micronutrient (Mo, Fe, Co) supply *via* certified seed and *Rhizobia* supply *via* seed coating.

► *Bombus hortorum* colonies available for purchase.

► ?

Andy Bounds in Brussels,
Published Dec 4 2025.

FINANCIAL TIMES

Agricultural production + Add to myFT

Brussels backs softer regime for gene-edited plants

Agreement over lighter-touch regulation marks first big loosening of rules since 'Frankenfoods' outcry 20 years ago

The future is open and today we do not know what will be 'just normal' in one year from now (today is Dec 8 2025)…

By the way: Typically, about half of all faba bean acreage in D is **organic** ;-)