

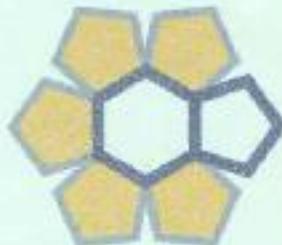
Klarifikasi: (lampiran bukti kehadiran)

Poster yang berjudul: “Auxin Binding Protein 1 (ABP1), the second auxin receptor“ dipublikasikan dalam bentuk poster presentation pada international symposium ACPD (Auxin and Cytokinin in Plant Development) Prague – Ceko, 10-14 Juli 2009 yang diselenggarkan oleh Institute of Experimental Botany of the AS CR , v.v.i. bekerja sama Czech University of Life Science Prague. Konferensi ini tidak menyediakan adanya proseding sehingga publikasi ini **tergolong tidak dimuat dalam prosiding**. Informasi tentang konferensi (paniti penyelenggara, peserta dan poster/makalah yang dipresentasikan) terinfokan pada book of abstract (dilampirkan). Hanya peserta yang mempresentasikan makalahnya secara oral (Oral presentation) yang diminta untuk menyerahkan artikelnya, sedangkan publikasi berupa presentasi poster, tidak disyaratkan adanya artikel. Sebagai bukti keikutsertaan kami dilampirkan

- Sertifikat kehadiran
- Book of Abstract (Programme)
- File yang berisi URL dari konferensi ACPD 2009

ACPD 2009

Auxin and Cytokinins in Plant Development
International Symposium
July 10 – 14, 2009, Prague, Czech Republic



LETTER OF CONFIRMATION

This is to confirm that

Yunus effendi

attend the International Symposium of Auxin and Cytokinins in Plant Development,

July 10-14, 2009, Prague, Czech Republic

Organizer

Eva Zažímalová, PhD.

Organized by



Institute of Experimental
Botany of the AS CR, v. v. i.



In cooperation with



ACPD 2009

Auxins and Cytokinins in Plant Development
International Symposium
July 10-14, 2009, Prague, Czech Republic

PROGRAMME
BOOK OF ABSTRACTS
LIST OF PARTICIPANTS

ACPD 2009

Auxins and Cytokinins in Plant Development
International Symposium
July 10-14, 2009, Prague, Czech Republic

Organized by



**Institute of Experimental
Botany of the AS CR, v.v.i.**

in co-operation with



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Eva Zažímalová, **Chair**, Institute of Experimental Botany AS CR, Prague

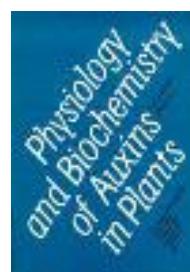
Past meetings



Liblice
September 11-15
1972



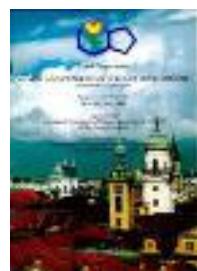
Liblice
June 18-22
1984



Liblice
September 28-October 2
1987



Liblice
September 10-14
1990



Prague
July 26-30
1999



Prague
July 7-12
2005

Table of Contents

Organizing Committee	2
Table of Contents	3
Programme At a Glance	5
Programme	7
Plenary Lectures	13
Session 1: Biosynthesis and Metabolism	15
Session 2: Signalling and Development	29
Session 3: Pattern Formation and Development	47
Session 4: Transport and Development	63
Session 5: Hormone Interactions and Plant Architecture	77
Session 6: Hormones, Environment and Applications	87
Session 7: Modelling and Advanced Methods	101
List of Participants	113
Author Index	121



OPERAČNÍ PROGRAM PRAHA
KONKURENCESCHOPNOST

PRA | HA
PRA | GUE
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PRA | G



The Institute of Experimental Botany of the Academy of Sciences of the Czech Republic obtained new equipment that will greatly facilitate its research in molecular and cellular plant biology. Instead of manually, routine laboratory work will now be performed by robots which are faster, more reliable, and more efficient. The equipment was financed by the European Fund for Regional Development via the Operational Programme Prague – Competitiveness.

The Institute purchased three automated systems for processing of plant samples. The systems will be used for isolation and analysis of nucleic acids, for proteomic analyses, and for *in situ* hybridisations and immunohistochemistry.

EVROPSKÝ FOND PRO REGIONÁLNÍ ROZVOJ

PRAHA & EU: INVESTUJEME DO VAŠÍ BUDOUCNOSTI

Programme At a Glance

Friday, July 10

16.00 - 20.00 Registration and poster mounting

Saturday, July 11

08.00 - 08.45	Registration and poster mounting
08.45 - 09.00	Opening of the Symposium
09.00 - 10.30	Plenary lectures
10.30 - 11.00	Coffee
11.00 - 12.35	Session 1: Biosynthesis and Metabolism
12.35 - 14.05	Lunch
14.05 - 15.40	Session 1: Biosynthesis and Metabolism
15.40 - 16.10	Coffee
16.10 - 17.25	Session 2: Signalling and Development
17.30 - 19.30	Poster Session I (P1, P2, P3), light refreshment
19.30 - 21.00	Get-together Party

Sunday, July 12

08.30 - 10.15	Session 2: Signalling and Development
10.15 - 10.45	Coffee
10.45 - 12.00	Session 2: Signalling and Development
12.00 - 13.30	Lunch
13.30 - 15.25	Session 3: Pattern Formation and Development
15.25 - 15.55	Coffee
15.55 - 17.50	Session 3: Pattern Formation and Development
18.00 - 20:00	Poster Session II (P4, P5, P6, P7), light refreshment

Monday, July 13

08.30 - 10.15	Session 4: Transport and Development
10.15 - 10.45	Coffee
10.45 - 12.40	Session 4: Transport and Development
12.40 - 14.10	Lunch
14.10 - 15.55	Session 5: Hormone Interactions and Plant Architecture
15.55 - 16.25	Coffee
16.25 - 17.40	Session 5: Hormone Interactions and Plant Architecture
17.50	Departure to Liblice
19.00 - 23.00	Congress Dinner at Liblice Castle

Tuesday, July 14

08.30 - 10.05	Session 6: Hormones, Environment and Applications
10.05 - 10.35	Coffee
10.35 - 12.30	Session 6: Hormones, Environment and Applications
12.30 - 14.00	Lunch
14.00 - 15.50	Session 7: Modelling and Advanced Methods
15.50 - 16.20	Coffee
16.20 - 18.10	Session 7: Modelling and Advanced Methods
18.10 - 18.30	Closing of the Symposium
18.30 - 22.00	Farewell Party

ACPD 2009 Programme

Friday, July 10

16.00 - 20.00 Registration and poster mounting

Saturday, July 11

08.00 - 08.45 Registration and poster mounting
08.45 - 09.00 Opening of the Symposium

Plenary lectures

Chair: Miroslav Kamínek

09.00 - 09.45 Auxin transport - connecting cell polarity and patterning
Jiří Friml, VIB, Ghent University, Belgium

09.45 - 10.30 Cytokinin signaling: Two components and more
Joseph Kieber, University of North Carolina, Chapel Hill, NC, USA

10.30 - 11.00 Coffee

Session 1: Biosynthesis and Metabolism

Chair: Karin Ljung

11.00 - 11.35 O1-1 Cytokinin biosynthesis pathway: not as simple as it looks
Hitoshi Sakakibara, RIKEN Plant Science Center, Yokohama, Japan
OICheIm Honorary Lecture

11.35 - 11.55 O1-2 Cytokinin interconversion is disrupted by adenosine kinase deficiency
Barbara Moffatt, University of Waterloo, Canada

11.55 - 12.15 O1-3 Structural characterization of cytokinin oxidase/dehydrogenase mutants
David Kopečný, INRA, France and Palacký University, Olomouc, Czech Republic

12.15 - 12.35 O1-4 Cis-zeatins in plants: their distribution, bioactivities, transport and metabolism
Václav Motyka, Institute of Experimental Botany AS CR, Prague, Czech Republic

12.35 - 14.05 Lunch

Chair: Hitoshi Sakakibara

14.05 - 14.40 O1-5 Regulation of auxin and cytokinin metabolism during *Arabidopsis* root development
Karin Ljung, Umeå Plant Science Centre, Sweden
OICheIm Honorary Lecture

14.40 - 15.00 O1-6 Proteomics and metabolomics of cytokinin-induced bud formation in *Physcomitrella patens*
Anika Erxleben, University of Freiburg, Germany

15.00 - 15.20 O1-7 Oxylipins contribute to the transcriptional regulation of YUC8 and YUC9, thereby controlling local auxin biosynthesis in *Arabidopsis thaliana*
Stephan Pollmann, Ruhr-University Bochum, Bochum, Germany

- 15.20 - 15.40 O1-8 **Auxin amidohydrolases from *Brassica rapa* cleave conjugates of indole propionic and indole butyric acid as preferable substrates: a biochemical and modelling approach**
Jutta Ludwig-Müller, Technische Universität Dresden, Dresden, Germany

15.40 - 16.10 Coffee

Session 2: Signalling and Development

Chair: Tatsuo Kakimoto

- 16.10 - 16.45 O2-1 **Interpreting the tracks of cytokinin signaling during *Arabidopsis* gametophyte and embryo development**
Bruno Müller, Harvard Medical School, Boston, USA and University of Zürich, Switzerland

- 16.45 - 17.05 O2-2 **Analysis of cytokinin receptor specificity in *Arabidopsis thaliana***
Michael Riefler, Freie Universität Berlin, Germany

- 17.05 - 17.25 O2-3 **Cytokinin response factors in *Arabidopsis* and tomato**
Aaron M. Rashotte, Auburn University, Auburn, AL, USA

17.30 - 19.30 **Poster Session I (P1, P2, P3)**, light refreshment. Posters with odd and even numbers should be presented from 17.30 to 18.30 and from 18.30 to 19.30, respectively.

19.30 - 21.00 Get-together Party

Sunday, July 12

Chair: Mark Estelle

- 08.30 - 09.05 O2-4 **The TAF-related protein CKH1 and the chromatin remodeling-factor CKH2 negatively regulate cytokinin-induced callus formation in *Arabidopsis***
Tatsuo Kakimoto, Osaka University, Japan
- 09.05 - 09.35 O2-5 **Histidine kinases CKI1, AHK2 and AHK3 control vascular tissue development in *Arabidopsis* shoots**
Ilwoo Hwang, Pohang University of Science and Technology, Pohang, Korea
- 09.35 - 09.55 O2-6 **Early cytokinin response proteins and phosphoproteins of *Arabidopsis thaliana***
Martin Černý, Mendel University of Agriculture and Forestry & Institute of Biophysics AS CR, v.v.i., Brno, Czech Republic

- 09.55 - 10.15 O2-7 **The *Arabidopsis* cytokinin response is mediated by tissue-specific transcriptional cascades**
Eric G. Schaller, Dartmouth College, Hanover, NH, USA

10.15 - 10.45 Coffee

Chair: Bruno Müller

- 10.45 - 11.20 O2-8 **Auxin signaling: A short (but complex) pathway**
Mark Estelle, The University of California, CA, USA
- 11.20 - 11.40 O2-9 **A cellular expression map of the auxin response factor family reveals cell type-specific auxin responses**
Barbara Möller, Wageningen University, Wageningen, The Netherlands

- 11.40 - 12.00 O2-10 **Activation mechanism of patatin-related phospholipase A by phosphorylation and function of phospholipases A in auxin and light signaling**
Günther F.E. Scherer, University Hannover, Hannover, Germany

12.00 - 13.30 Lunch

Session 3: Pattern Formation and Development

Chair: Sabrina Sabatini

- 13.30 - 14.05 O3-1 **Integration of hormonal and genetic regulation during vascular morphogenesis in Arabidopsis**
Ykä Helariutta, University of Helsinki, Finland

- 14.05 - 14.25 O3-2 **Molecular analysis of auxin regulation of wood formation**
Rishikesh P. Bhalerao, Umeå Plant Science Center, Umeå, Sweden

- 14.25 - 14.45 O3-3 **DORNROESCHEN and DORNROESCHEN-LIKE function with the CUC genes and MP to modulate embryo symmetry via auxin-dependent pathways**
John W. Chandler, Cologne, Germany

- 14.45 - 15.05 O3-4 **Multiple monopteros-dependent pathways are involved in leaf initiation**
Jim Mattsson, Simon Fraser University, Canada

- 15.05 - 15.25 O3-5 **Auto-regulated expression of cytokinin biosynthesis confers drought tolerance in plants**
Shimon Gepstein, Faculty of Biology, Technion, Haifa, Israel

15.25 - 15.55 Coffee

Chair: Ykä Helariutta

- 15.55 - 16.30 O3-6 **A genetic framework for the auxin/cytokinin control of cell division and differentiation in the root meristem**
Sabrina Sabatini, Sapienza University of Rome, Italy

- 16.30 - 16.50 O3-7 **The role of cytokinin response factors during lateral root initiation**
Giel van Noorden, VIB, Ghent University, Belgium

- 16.50 - 17.10 O3-8 **KNOXI genes and cytokinin regulate leaf development**
Naomi Ori, The Hebrew University of Jerusalem, Rehovot, Israel

- 17.10 - 17.30 O3-9 **Small RNAs facilitate polarity and laminar growth of tomato leaves**
Tamar Yifhar, The Weizmann Institute of Science, Rehovot, Israel

- 17.30 - 17.50 O3-10 **Cytokinins can stimulate *Arabidopsis* hypocotyl elongation at decreased light intensity**
Alena Reková, Mendel University of Agriculture and Forestry and Institute of Biophysics AS CR, v.v.i., Brno, Czech Republic

18.00 - 20:00 **Poster Session II (P4, P5, P6, P7)**, light refreshment. Posters with odd and even numbers should be presented from 17.30 to 18.30 and from 18.30 to 19.30, respectively.

Monday, July 13**Session 4: Transport and Development****Chair: René Benjamins**

08.30 - 09.05	O4-1	Lateral root development: an emerging story... Malcolm J. Bennett, University of Nottingham, UK
09.05 - 09.35	O4-2	Comparison of transport activity and interactions of ABCB, AUX1, and PIN auxin transporters Angus S. Murphy, Purdue University, West Lafayette IN, USA
09.35 - 09.55	O4-3	Auxin influx carriers are involved in regulating apical hook development of Arabidopsis Filip Vandenbussche, Ghent University, Ghent, Belgium
09.55 - 10.15	O4-4	PINOID controls PIN1 polar targeting through evolutionarily conserved phosphoserines Fang Huang, Institute of Biology, Leiden University, Leiden, The Netherlands
10.15 - 10.45		Coffee
		Chair: Malcolm J. Bennett
10.45 - 11.20	O4-5	Up and down and all around: PIN polarity regulation in Arabidopsis René Benjamins, University of Utrecht, Utrecht, The Netherlands
11.20 - 11.40	O4-6	Mechanistic framework for polar PIN targeting Jürgen Kleine-Vehn, VIB , University Gent, Gent, Belgium
11.40 - 12.00	O4-7	The NPA-binding protein TWISTED DWARF1 controls ABCB-mediated auxin transport Hanna Valpuri Soviero, University of Zurich and Zurich-Basel Plant Science Center, Zurich, Switzerland
12.00 - 12.20	O4-8	Post-transcriptional control of PIN expression by an <i>Arabidopsis thaliana</i> elongator complex Johannes Leitner, University of Natural Resources and Applied Life Sciences, Vienna, Austria
12.20 - 12.40	O4-9	ROCK1 encodes a putative transport protein of unknown function Tomáš Werner, Free University Berlin, Germany
12.40 - 14.10		Lunch

Session 5: Hormone Interactions and Plant Architecture**Chair: Christine A. Beveridge**

14.10 – 14.45	O5-1	Long range signalling in the control of shoot branching Ottoline Leyser, University of York, York, UK
14.45 – 15.15	O5-2	Auxin - cytokinin interaction shaping root architecture Eva Benková, VIB, University Gent, Belgium

15.15 - 15.35	O5-3	Apical dominance is controlled by interaction between cytokinin biosynthesis/degradation and auxin in stem Hitoshi Mori, Nagoya University, Nagoya, Japan
15.35 – 15.55	O5-4	Cytokinins modulate auxin-induced organogenesis in plants via regulation of the auxin efflux Markéta Pernisová, Masaryk University, Brno, Czech Republic
15.55 - 16.25		Coffee Chair: Ottoline Leyser
16.25 - 17.00	O5-5	Regulation of axillary bud outgrowth by strigolactones Christine A. Beveridge, University of Queensland, Brisbane, Australia
17.00 - 17.20	O5-6	Spatial and temporal regulation of auxin and cytokinin gene expression and responses in pea ramosus mutants Colin Turnbull, Imperial College London, London, UK and University of Massachusetts, Amherst, MA, USA
17.20 - 17.40	O5-7	Competitive canalization of PIN-dependent auxin flow from axillary buds controls apical dominance in pea Jozef Balla, Mendel University of Agriculture and Forestry, Brno, Czech Republic
17.50		Departure to Liblice
19.00 - 23.00		Congress Dinner at Liblice Castle

Tuesday, July 14

Session 6: Hormones, Environment and Applications

		Chair: Thomas Schmülling
08.30 - 09.05	O6-1	The importance of plant biotechnology for society and environment Marc Van Montagu, Ghent University, Ghent, Belgium
09.05 - 09.25	O6-2	Characterization and biological activity of novel purine-derived inhibitor of cytokinin oxidase/dehydrogenase INCYDE and its potential use for in vivo studies Lukáš Spíchal, IEB AS CR & Palacký University, Olomouc, Czech Republic
09.25 - 09.45	O6-3	Light/PHOT1-dependent polar translocation of PIN3 auxin carrier during phototropisms in Arabidopsis Zhaojun Ding, VIB, Ghent University, Ghent, Belgium
09.45 - 10.05	O6-4	Cytokinin regulates sodium homeostasis Michael Mason, University of Queensland, Australia
10.05 - 10.35		Coffee Chair: Marc Van Montagu
10.35 - 11.10	O6-5	Applied perspective of cytokinin-mediated growth modulation in crop plants Thomas Schmülling, Free University of Berlin, Germany

11.10 - 11.30	O6-6	Molecular and functional analyses of changes in the pedicel abscission zone transcriptome following auxin depletion Shimon Meir, ARO, The Volcani Center, Bet-Dagan, Israel
11.30 - 11.50	O6-7	Cytokinin signalling in <i>Medicago truncatula</i> root and nodule organogenesis Florian Frugier, Institut des Sciences du Végétal, CNRS, Gif-sur-Yvette, France
11.50 - 12.10	O6-8	Comparison of cytokinin role in drought and heat stress response of tobacco plants Radomíra Vařková, Institute of Experimental Botany AS CR, Prague, Czech Republic
12.10 - 12.30	O6-9	Metabolism and possible function of cytokinin during abiotic stress in maize Petr Galuszka, Palacký University & Institute of Experimental Botany AS CR, Olomouc, Czech Republic
12.30 - 14.00		Lunch

Session 7: Modelling and Advanced Methods

		Chair: Przemek Prusinkiewicz
14.00 - 14.35	O7-1	Quantitative approaches to plant development Cris Kuhlemeier, University of Bern, Switzerland
14.35 - 15.10	O7-2	A computational model of phyllotaxis in Costus Przemek Prusinkiewicz, University of Calgary, Canada
15.10 - 15.30	O7-3	Agent based modelling of auxin transport canalisation Philip Garnett, University of York, York, UK
15.30 - 15.50	O7-4	Towards a model of auxin response in root epidermis Martin Kieffer, University of Leeds, UK
15.50 - 16.20		Coffee
		Chair: Cris Kuhlemeier
16.20 - 16.50	O7-5	Modelling of auxin transport processes on a single cell level Klára Hoyerová, Institute of Experimental Botany AS CR, Prague, Czech Republic
16.50 - 17.10	O7-6	Modelling of positive-feedback mechanism for auxin carrier polarization during auxin-dependent plant development Krzysztof Wabnik, VIB, Ghent University, Ghent, Belgium
17.10 - 17.30	O7-7	Developing a real-time, quantitative biosensor for auxin and ABA Richard Napier, University of Warwick, UK
17.30 - 17.50	O7-8	Highly sensitive and high-throughput analysis of plant hormones using MS-probe modification and UPLC-ESI-qMS/MS: an application for hormone profiling in <i>Oryza sativa</i> Hitoshi Sakakibara, RIKEN Plant Science Center, Yokohama, Japan
17.50 - 18.10	O7-9	New purification and mass spectrometric approach for cytokinin analysis Ondřej Novák, Palacký University & Institute of Experimental Botany, Olomouc, Czech Republic
18.10 - 18.30		Closing of the Symposium
18.30 - 22.00		Farewell Party

P2-5 AUXIN-BINDING PROTEIN1 (ABP1), THE SECOND AUXIN RECEPTOR

Yunus Effendi, Günther F.E. Scherer

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Despite of knowing the 3-dimensional structure ABP1 is not fully acknowledged as an auxin receptor. We used the ABP1 insertional mutant (Chen et al. 2001). It is lethal when homozygous but viable in the hemizygous *abp1/ABP1* state. Hemizygous plants produce 2:1 resistant:wild type progeny on kanamycin agar due to the T-DNA. Seedlings from *abp1/ABP1* plants are defect in phototropism and gravitropism of roots and shoots. Those populations are composed of a major slow reacting and a minor normal reacting group. *abp1/ABP1* seedlings show strong root slanting, longer hypocotyls, and slightly increased lateral root number. Root auxin responses in *abp1/ABP1* seedlings are slightly less sensitive than in wt. In short days and long days *abp1/ABP1* plants flower earlier. They have more branches and decreased main stem diameter, indicating decreased apical dominance. Auxin-induced genes (qPCR: IAA2, IAA11, IAA13, IAA14, IAA19, IAA20) respond to auxin (0.1µM/1µM/10µM) 2-10 fold stronger in wt than in *abp1/ABP1* seedlings (30 & 60 min). Thus ABP1 is a receptor with probable functions in auxin transport and gene regulation. The apparent functional link to TIR1-linked gene regulation could be provided by phospholipase A (Scherer et al., 2007)

P2-7 THE ROLE OF FUSICOCCINE-LIKE SECONDARY HORMONE IN THE CYTOKININE SIGNAL TRANSDUCTION.

Gilmanov M.K., Ibragimova S.A., Kudaibergenov K.K., Dukumbayeva A.U.

M.A. Aytkhozhin's Institute of Molecular Biology and Biochemistry; baltakay@mail.ru

It was shown that cytokinine causes the formation of cytokinine secondary hormone (CSH) in embryos of germinating wheat seeds. CSH was purified by chromatography on nanostructured carbon sorbent "Nanocarbosorb". It was established by mass-spectra that CSH related to fusicoccine. The CSH showed the typically cytokinine activities such as: the derepression of apical dominance, the greening of yellow leaves and synthesis of amaranthin. CSH was active at concentration 1000 times less at 2-3 times quicker, than cytokinine. The one of interesting property of CSH is its ability to increase the tolerance of germinating wheat seeds to salt stress. We developed very interesting enzyme sensor model for investigation of signal transduction of cytokinine. It was established that cytokinine causes the formation of NADP-GDh in aleurone layer of wheat seeds. We suggest the next scheme of signal transduction of cytokinine. First step is the formation of CSH. Then molecules of CSH are binded with fusicoccine receptors of plasmatic membrane. This let to increase the level cytosolic Ca²⁺. The last step of signal transduction is switching on the activity of protein kinase C. But this process demands the present of another low molecular regulator which is formed under the effect of CSH on wheat seeds embryos.

P2-6 LIGHT ALTERS PLANT ELONGATION RESPONSES TO EXOGENOUS AUXIN

Martin Fellner^{1,2}, Renáta Plotzová¹, Jana Bořucká¹, Tereza Vaclová¹, Jirí Řehulká¹, David Zalabák¹, Marta Hlobilová¹

¹ Laboratory of Molecular Physiology, Department of Cell Biology and Genetics, Palacky University in Olomouc, Šlechtitelů 11, 783 71, Olomouc, Czech Republic ² Laboratory of Growth Regulators, Palacky University in Olomouc and Institute of Experimental Botany ASCR, v.v.i, Šlechtitelů 11, 783 71, Olomouc, Czech Republic

Many fundamental issues of interaction between light and hormone signaling pathways involved in plant growth remain to be uncovered. In model plants *Arabidopsis*, tomato and maize we investigated effects of light on plant growth responses to exogenous auxins. In dark, blue light (BL) and red light (RL), exogenous auxin inhibits long-term growth in intact *Arabidopsis* and tomato hypocotyl, and in corn coleoptile. Compared to dark- and RL-grown plants, inhibitory effect of auxin on elongation of *Arabidopsis* hypocotyl developed in BL is weak. Mutant analyses revealed that CRY1 mediates Bluelight reduction of hypocotyl sensitivity to exogenous auxin, and that ZTL1 is required for maintenance of hypocotyl response to exogenous auxin in BL and RL. Photoreceptor CRY1 is also involved in BL- and RL-induced reduction of hypocotyl sensitivity to NAA in tomato. Data indicate that tomato hypocotyl responses to the inhibitory effects of NAA and 2,4-D are regulated by light via different mechanisms. Analysis of *elm1* mutant in corn indicated that phytochromes mediate the BL- RL-induced decline in coleoptile response to exogenous auxin. Our results confirmed the existence of interaction between light and auxin signaling in plant growth. Analyses also suggest the existence of diverse mechanisms of the cross-talk between light and auxin in different plant species.

This work was supported by grant from Ministry of Education of the Czech Republic to MF (grant no. 1P05ME792).

P2-8 UNCOVERING THE DISTINCT ROLES OF AUXIN SIGNALING F-BOX (AFB) 4 AND 5 AS AUXIN RECEPTORS

Katie Greenham & Mark Estelle

Section of Cell and Developmental Biology, University of California San Diego, La Jolla, California

The auxin receptor family is comprised of six members; TIR1 and AFB1-5. Phylogenetic analysis reveals that the AFB4/5 clade diverged from the other members before seed plant radiation whereas the TIR1/AFB1 and AFB2/3 clades diverged within the angiosperm lineage (Prigge & Estelle, unpublished). The conservation of these receptors across seed plants suggests that they maintain a distinct function. Our goal is to understand the diverse functions of AFB4/5 in relation to other members of the family. Preliminary studies reveal that picloram works specifically through AFB4/5. The *afb4-2* and *afb5-5* single mutants are resistant to picloram compared to wild type while *tir1-1* is not. Biochemical analysis confirms that picloram enhances the affinity of Aux/IAA with AFB4/5 but not with TIR1. The basis for this specificity remains unknown. The *afb4-2afb5-5* double displays hypersensitivity to root growth at 29C, a condition that results in increased levels of auxin biosynthesis. In contrast, the *tir1-1afb2-3* mutants are resistant at 29C. To improve our understanding of TIR1/AFB function we are generating and characterizing all mutant combinations in conjunction with an investigation of the biochemical properties of AFB4/5 compared to TIR1.

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Author Index

Abdel-Hady, M.S.	23	Choi, S.	33	Ge, L.	36
Abdelhamid, M.T.	96	Choi, S.M.	33	Geelen, D.	111
Alvarez, J.	55	Choi, Y.I.	58	Geisler, M.	69
Amsellem, Z.	55	Choi, K.S.	58	Geiss, G.	45
Ananiev, E.D.	96	Chriqui, D.	58	Gepstein, A.	51
Ananieva, K.	96	Christian, M.	42	Gepstein, S.	51
Andreev, I.	42	Cole, M.	49	Gessler, A.	20
Aoyama, T.	52, 85	Comelli, P.	49	Gilmanov, M.K.	40
Arbeiter, A.	30	Costantino, P.	52, 85	Girault, T.	39
Argueso, C.	14	Crespi, M.	93	Goertzen, L.R.	31
Argyros, R.D.	35	Cutcliffe, J.W.	31	Gouzy, J.	93
Ariel, F.	93	Cvrčková, H.	59, 110	Govaerts, W.	105
Arite, T.	85	Černý, M.	34	Gratão, P.L.	96
Ashikari, M.	108	Červinková, H.	94, 110	Greb, T.	44
Azevedo, R.A.	96	Čovanová, M.	72, 75	Greenham, K.	36, 40
Bădescu, G.	107	Čudejková, M.	39, 59	Grenković, R.	22
Bailly, A.	69	Dale, N.	111	Greplová, J.	110
Bairu, M.	23	Dawood, M.G.	96	Grimm, B.	58
Bálint, P.	25	De Wilde, J.	111	Gruden, K.	22
Balla, J.	83	Del Bianco, M.	110	Guinel, F.C.	58
Baluška, F.	75	Dello Iorio, R.	52, 85	Guivarc'h, A.	58
Bandyopadhyay, A.	98	Demura, T.	32	Gupta, S.	31
Bangari, B.	98	Dermendjiev, G.	38	Gutiérrez, L.	60
Banner, I.	51	Dettmer, J.	47, 61	Hanada, A.	85
Bartrina, I.	39, 57, 71	Dhonukshe, P.	74	Hansen-Møller, J.	61
Bassoriello, M.M.I.	24	Ding, Z.	59, 89	Hartmann, P.M.	57
Basygarayev, Z.H.	97	Divíšková, E.	34	Hauserová, E.	110, 110
Beeckman, T.	31, 53	Dobešová, R.	33	Hayward, A.R.	24
Begum, T.	27	Dobrá, J.	23, 94	Hazak, O.	72
Bellini, C.	60	Dobrev, P.I.	18, 23, 75, 84, 96, 106	Hejátko, J.	33, 41, 41, 43, 59, 80, 84
Benjamins, R.	67	Doležal, K.	23, 23, 59, 109, 110	Helariutta, Y.	47, 61, 61, 84
Benková, E.	39, 57, 59, 65, 78, 84	Dopitová, R.	43	Hellmann, E.	31, 41
Bennett, M.J.	60, 63, 65	Dragičević, I.	84	Help, H.	47, 84
Bergougoux, V.	39, 59	Draye, X.	60	Henry, C.	39
Berkowitz, O.	21	Drdová, E.	72	Henrich, M.	21
Berleth, T.	50	Dubová, J.	24, 80	Heyl, A.	31, 41
Berner, T.S.	98	Dubrovsky, J.G.	57	Hill, K.	35
Barte, K.	22	Duclercq, J.	57	Hlinková, E.	24, 96
Beveridge, C.A.	81, 84	Dukumbayeva, A.U.	40	Hlobilová, M.	40
Bhalerao, R.P.	48	Dun, E.A.	81, 84	Hluska, T.	26
Bielach, A.	39	Dundálková, L.	25	Holk, A.	38
Bilyeu, K.D.	26	Dyčka, F.	34, 97	Holst, K.	58
Bishopp, A.	47, 84	Effendi, Y.	40	Holzwarth, M.	71
Blakeslee, J.J.	98	Eliášová, K.	84	Honkanen, A.	47
Blehová, A.	24	Elo, A.	47	Horák, J.	33, 43, 80
Bloch, D.	72	El-Shawk, S.	47	Hosein, F.N.	98
Blumwald, E.	51	Emery, N.	16, 24	Hošek, P.	73, 106
Bobák, M.	24	English, J.T.	26	Houba-Hérin, N.	17
Bobáková, J.	34, 97	Erxleben, A.	20, 44	Hoyerová, K.	18, 27, 65, 73, 73, 73, 75, 80, 84, 106
Borkovcová, P.	41	Eshed, Y.	55, 58, 59	Huang, F.	66
Börner, T.	45, 86	Estelle, M.	36, 40, 41, 42	Hwang, I.	33
Borůcká, J.	40	Farrow, S.	16	Ibragimova, S.A.	40, 97
Bradáčová, A.	25	Fellner, M.	39, 40, 59	Immanen, J.	47
Braun, H.	39	Feraru, E.	72, 75	Ishikawa, S.	85
Brenner, W.G.	57	Feraru, M.	72	Iwakawa, H.	58
Brewer, P.B.	81, 84	Ferguson, B.J.	84	Iwasaki, M.	58
Briozzo, P.	17	Fernandez-Núñez, M.	26	Jäger, G.	70
Brzobohatý, B.	23, 24, 25, 33, 34, 56, 97, 97, 98	Ferreira, F.	14	Janda, I.	41, 43
Bukanova, E.	97	Fleming, A.J.	110	Janda, T.	110
Burd, S.	92	Floková, K.	26	Jaworek, P.	26
Burke-West, C.	24	Frank, W.	44	Jelínková, A.	73
Bussell, J.D.	60	Frébort, I.	17, 26, 44, 111	Jiang, C.-Z.	92
Byström, A.	70	Frébortová, J.	24	Jířina, M.	73, 106
Calderon-Villalobos L.I.	36	Friml, J.	13, 57, 59, 61, 68, 69, 72, 72, 72, 73,	Jones, B.	45
Campilho, A.	47, 61, 61	Frigier, F.	74, 75, 75, 80, 83, 84, 89, 105	Jorda, R.	24
Castelain, M.	60	Furuta, K.	32	Joseph, M.	111
Castillejo, C.	36	Furutani, M.	57	Jurišić-Knežev, D.	59
Chan, R.	93	Gajdošová, S.	18, 27, 84	Kakimoto, T.	32
Chandler, J.W.	49	Galuszka, P.	26, 26, 62, 88, 95	Kalousek, P.	83
Chapman, E.	36, 41	Galvan Ampudia, C.	66	Kamada-Nobusada, T.	108
Cheng, Y.	98	Garnett, P.	103	Kamel, H.A.	96
Chernov, Z.	85	Gaudinová, A.	18, 94	Kamínek, M.	18, 23, 27, 84, 96
Chiang, Y. H.	35			Karady, M.	59, 110
Choe, G.	36				

Kepinski, S.	43, 104, 110	Marhavý, P.	59	Plet, J.	93
Khater, M.A.	23	Martinec, J.	73	Plotzová, R.	40
Kieber, J.J.	14, 35	Masle, J.	21	Pollmann, S.	21
Kieffer, M.	104	Mason, M.	90	Pons, S.	60
Kim, G.-T.	33	Mathews, D.E.	35	Popa, I.	43
Kim, H.J.	35	Matrosova, A.	43	Popelková, H.	17
King, J.	63, 104	Matsuoka, M.	108	Pôrs, Y.	58
Kiran, N.S.	24	Mattsson, J.	50	Pospíšilová, H.	44
Klaumünzer, M.	97	Medvedev, S.	26	Prigge, M.	36, 42
Kleine-Vehn, J.	68, 73, 74, 75, 89, 105	Meir, S.	85, 92	Priya, D.	98
Klemš, M.	25	Mellor, N.	63	Procházka, S.	25, 83
Klíma, P.	18, 73, 80, 84, 106	Middleton, A.	63, 104	Prusinkiewicz, P.	102
Klumpler, T.	41	Mikulík, J.	59, 110	Punwani, J.	14
Kociánová, A.	25	Minkina, Y.	86	Rademacher, E.H.	37
Kochanek, B.	92	Mirams, G.	104	Rameau, C.	81, 84
Kojima, M.	58, 108	Mishev, K.	96	Rashotte, A.M.	31, 53
Kolář, J.	23	Mizutani, M.	108	Rasmussen, H.N.	61
Köllmer, J.	25	Moffatt, B.	16	Raspor, M.	84
Kolouchová, T.	41	Möller, B.	37	Raz, V.	59, 65
Komatsu, H.	108	Monteiro, C.C.	96	Reid, M.S.	92
Kopečný, D.	17, 88	Mori, H.	79	Reichman, P.	80
Koukalová, Š.	34	Morita, M.T.	52, 85, 89	Reinol, V.	83
Kovaleva, L.	42, 86	Motte, H.	111	Reková, A.	56
Kowalczyk, M.	60	Motyka, V.	18, 23, 26, 26, 27, 84, 84, 94, 96	Reski, R.	20, 44
Kowalska, M.	26, 111	Moubayidin, L.	52, 85	Ricci, A.	60
Krämer, U.	99	Mravec, J.	75	Riefler, M.	30, 44, 97
Krasavin, E.A.	96	Müller, B.	29	Rietz, S.	38
Křeček, P.	74	Müller, D.	85	Riov, J.	85
Kubeš, M.	73, 73, 74	Murphy, A.S.	64, 72, 98	Rivero, R.	51
Kubo, M.	32	Mustroph, A.	58	Robert, S.	74
Kudaibergenov, K.K.	40	Nakamura, K.	52, 85	Rolčík, J.	39, 39, 59, 111
Kuhlemeier, C.	101	Napier, R.	107, 111	Rolli, E.	60
Kulaeva, O.N.	45	Napsucialy-Mendivil, S.	57	Romanov, G.A.	30, 42
Kuroha, T.	108	Neumannová, I.	56	Růžička, K.	47, 61, 78
Kusnetsov, V.V.	86	Neve, J.	43	Ryu, H.	33
Kyozuka, J.	85	Niemann, M.	71	Rehulka, J.	40
Laloue, M.	17	Niemenen, K.	47	Sabatini, S.	52, 85
Laňková, M.	73, 74, 106	Ninković, S.	84	Sabban, M.	55
Larrieu, A.	63	Nisler, J.	43, 44	Sakakibara, H.	15, 42, 79, 108
Lavy, M.	36, 42	Nitschke, S.	97	Salopek-Sondi, B.	22, 111
Lea, P.J.	96	Nodzyński, T.	75	Salt, D.	90
Leduc, N.	39	Noh, E.W.	58	Sato-Shimizu, S.	79
Lee, G.J.	98	Novák, J.	98	Sauer, M.	61
Lehesranta, S.	47	Novák, O.	23, 24, 25, 26, 59, 94, 95, 109, 110	Savić, B.	22
Leitner, J.	70	Nørbaek, R.	61	Sedlářová, M.	26
Lenobel, R.	109	Offringa, R.	66	Sehr, E.M.	44
Lers, A.	92	Oppermann, E.	38	Seifertová, D.	74
Leyser, O.	77, 85, 103	Ördög, V.	25	Shahar, G.	55
Liere, K.	45	Ori, N.	54	Shani, E.	54
Lifschitz, E.	59	Orman, B.	60	Shao, R.	36
Lichtenberger, R.	47	Otegui, M.S.	98	Shi, X.	31
Lindberg, S.	43	Ottó, E.	57	Shishkova, S.	57
Lindner, A.C.	26	Paciorek, T.	74	Shishova, M.	43
Liput, C.	57	Páčurár, D.J.	60	Schaller, G.E.	35, 90
Ljung, K.	19, 45, 104, 110	Páčurár, M.L.	60	Schenck, D.	42
Lokerse, A.S.	37	Palme, K.	33	Scherer, G.F.E.	27, 38, 40
Lomin, S.N.	30, 42	Parker, J.E.	38	Scheres, B.	67
Long, C.	58	Pavlú, J.	98	Schlosser, A.	20
Loose, M.	63	Peer, W.A.	98	Schmülling, T.	25, 30, 39, 44, 57, 57, 58, 71, 88, 91, 97, 99
Lubovská, Z.	94	Pejchar, P.	73	Schnurmacherová, D.	24
Ludwig-Müller, J.	22	Pekárová, B.	33, 41, 43	Schoor, S.	16
Lukšanová-Fuksová, H.	97	Pekker, I.	55, 58	Schuetz, M.	50
Luschnig, C.	70	Peled, D.	55	Schwambach, J.	60
Lüthen, C.H.	42	Pelleschi-Travier, S.	39	Schwarz, M.	44
MacNish, A.J.	92	Pěnčík, A.	39, 59, 111	Simon, S.	73, 74
Madzak, C.	17	Pepper, L.C.	31	Skúpa, P.	72, 75
Maekawa, M.	85	Peres, L.E.P.	60, 96	Slováková, L.	24
Magnus, V.	22, 111	Peret, B.	63	Slováková, K.	26
Machida, Y.	58	Perilli, S.	52, 85	Souček, P.	23, 25, 33, 56, 80, 97
Machida, C.	58	Pernisová, M.	80, 84	Sovero, V.	69
Máčková, P.	59, 110	Pešek, B.	65	Spíchal, L.	43, 44, 58, 88
Majira, A.	17	Petersson, S.V.	104, 110	Stepney, S.	103
Makam, S.N.	98	Petrášek, J.	59, 65, 72, 73, 73, 73, 74, 74, 75, 106	Stirk, W.A.	25
Malá, J.	59, 110	Philosoph-Hadas, S.	85, 92	Street, I.H.	35
Malbeck, J.	80, 94, 97	Pils, B.	41	Strnad, M.	25, 25, 26, 43, 59, 71, 88, 109, 110, 110, 111
Malínská, K.	73	Pino-Nunes, L.E.	60		
Mancuso, S.	69, 75				
Marečková, M.	97				
Marek, J.	41, 43				

Suer, S.	44	Yang, H.	64
Sundaresan, S.	92	Yemelyanov, V.	43
Suzuki, K.	108	Yevdakova, N.	26
Swarup, R.	65	Yifhar, T.	55
Synek, L.	72	Yonekura-Sakakibara, K.	42
Szűčová, L.	110	Yoshida, S.	57
Šebela, M.	17, 26	Young, N.	82
Šimášková, M.	78	Yu, H.	36
Šmehilová, M.	26	Zago, M.K.	66
Štorchová, H.	23, 94	Zakharova, E.	86
Tafesse, F.G.	38	Zalabák, D.	40
Takahashi, H.	58	Zatloukal, M.	43, 88
Takei, K.	108	Zažímalová, E.	65, 72, 73, 73, 73, 73, 74, 74, 75, 80, 106
Tanaka, M.	79	Zhang, J.	72, 75
Taniguchi, M.	52, 85	Zhao, Y.	21
Tarasova, O.	26	Zintl, S.	44
Tarkowski, P.	26, 111	Zolla, G.	45
Tasaka, M.	57, 89	Zubo, Y.O.	45, 86
Teige, M.	38	Zwiewka, M.	69, 75
Tejos, R.	61	Žádníková, P.	59, 65
Thélier-Huché, L.	39	Žárský, V.	72, 75
Tian, F.	111	Žídek, L.	43
Timofeeva, G.	42	Žížková, E.	18, 27
Titapiwatanakun, B.	64, 98		
To, J.	14		
Tomášová, R.	96		
Tomič, S.	21		
Trávníčková, A.	84		
Trčková, M.	23		
Třísková, O.	43		
Turčinov, H.	26		
Turečková, V.	94, 95		
Turnbull, C.	82		
Ueguchi-Tanaka, M.	108		
Ueno, Y.	58		
Umehara, M.	85		
Ursache, R.	47, 61		
Uřinovská, J.	44		
Václavíková, K.	26, 95		
Vaclavová, T.	40		
Válková, M.	80		
van der Berg, H.	107		
van der Klis, H.	67		
van der Straeten, D.	59, 65		
van Marion, A.	66		
van Montagu, M.	87		
van Noorden, G.	31, 53		
van Staden, J.	23, 25		
Vandenbussche, F.	59, 65		
Vaňková, R.	23, 94, 97, 110		
Vanneste, S.	53, 72		
Veierskov, B.	61, 98		
Verdenaud, M.	93		
Vervliet-Scheebaum, M.	20, 44		
Vijay Selvaraj, K.S.	92		
Viémont, J.-D.	39		
Villar, C.	27		
von Schwartzenberg, K.	26		
Voronkov, A.	42		
Vyroubalová, Š.	62, 95		
Wabnik, K.	105		
Wajeed, A.	98		
Wang, X.	64		
Wang, B.	69		
Ward, S.	85		
Waugh, R.	60		
Wegner, N.	26		
Weijers, D.	37		
Werbrouck, S.	111		
Werner, T.	25, 39, 57, 58, 71, 88, 99		
Werr, W.	49		
Wilhelmová, N.	94		
Wimalasekera, R.	27		
Xue, H.-W.	75		
Yakubov, B.	98		
Yalovsky, S.	72		
Yamaguchi, S.	85		
Yamburenko, M.V.	45, 86		

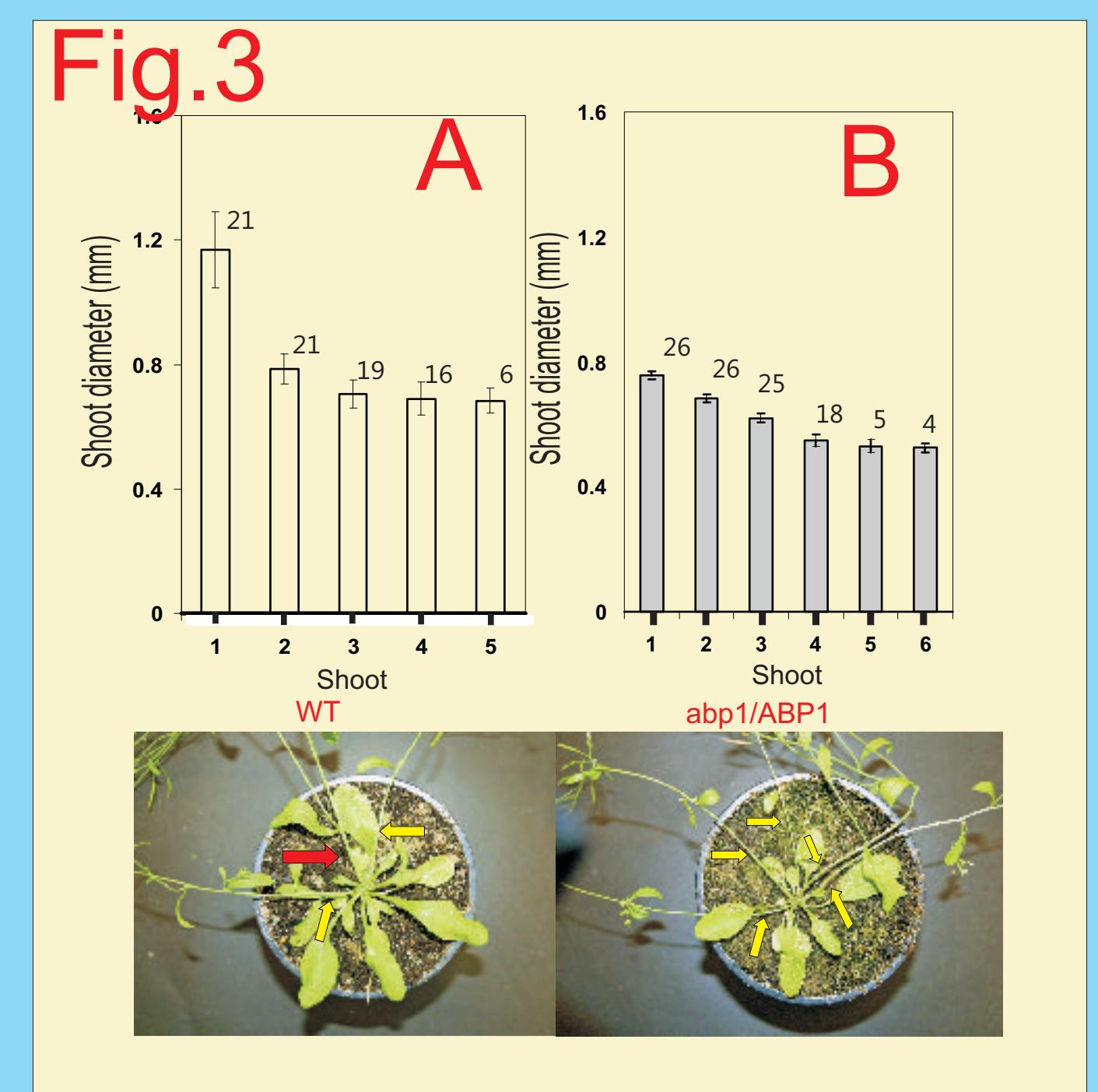
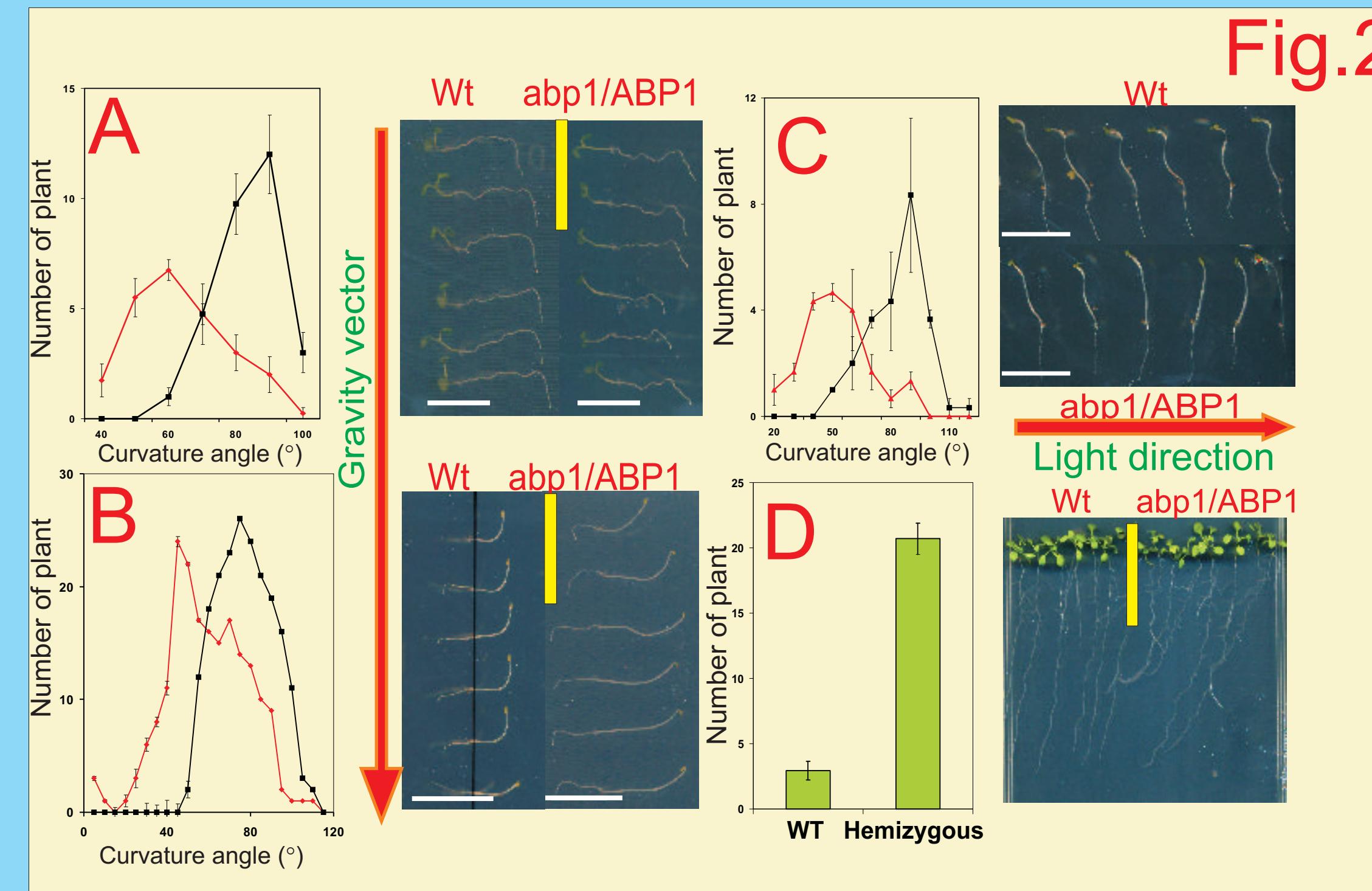
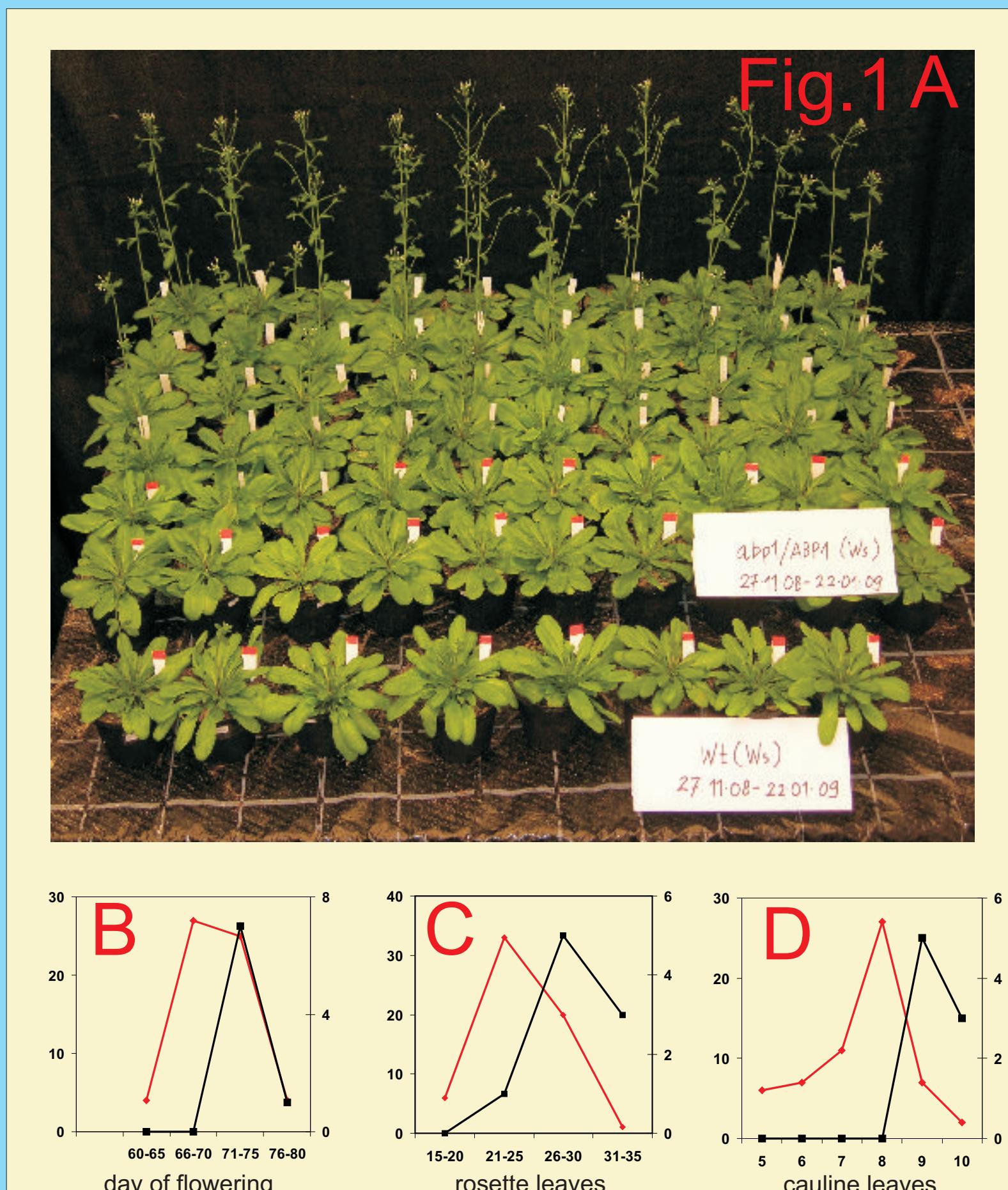
Auxin-Binding Protein 1 (ABP1), the second auxin receptor

Yunus effendi, Günther F.E. Scherer

Molecular Developmental Physiology, Leibniz University Hannover, Herrenhäuser Str. 2,
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ABSTRACT

Despite knowing 3-dimensional structure ABP1 is not fully acknowledged as an auxin receptor. We used the insertional ABP1 mutant (Chen et al., 2001). It is lethal when homozygous but viable in the hemizygous *abp1/ABP1* state. A hemizygous plant produces 2:1=resistant:wildtype progeny on kanamycin agar due to the T-DNA and this lethality. Seedlings form *abp1/ABP1* plants are defect in phototropism and gravitropism of shoots and roots. Those populations are composed of a major slow reacting and a minor normal reacting group. *ABP1/abp1* seedlings show strong root slanting, longer hypocotyls, and slightly increased lateral root numbers. Root auxin responses (lateral root, main root length) in *abp1/ABP1* seedlings are slightly less sensitive than in wt. In short days and long days *abp1/ABP1* plants flower earlier. They have more branches and decreased main stem diameter, indicating decreased apical dominance. Auxin-induced genes (qPCR: *IAA2*, *IAA11*, *IAA13*, *IAA14*, *IAA19*, *IAA20*, *GH3.5*, *SAUR9*, *SAUR15*, *SAUR23*) respond to auxin (0.1μM/1μM) 2-15 fold stronger in WT than in *abp1/ABP1* seedlings (30 and 60 min). Thus, ABP1 is a receptor with probable functions in auxin transport and gene regulation. The apparent functional link to TIR1-link gene regulation could be provided by phospholipase A (Scherer et al., 2007, FEBS Lett. 581:4205-4211).



Expression of early auxin-induced genes in hemizygous *abp1/ABP1* and Wt in response to auxin application shows that they are less auxin-sensitive and reveals a link to TIR1

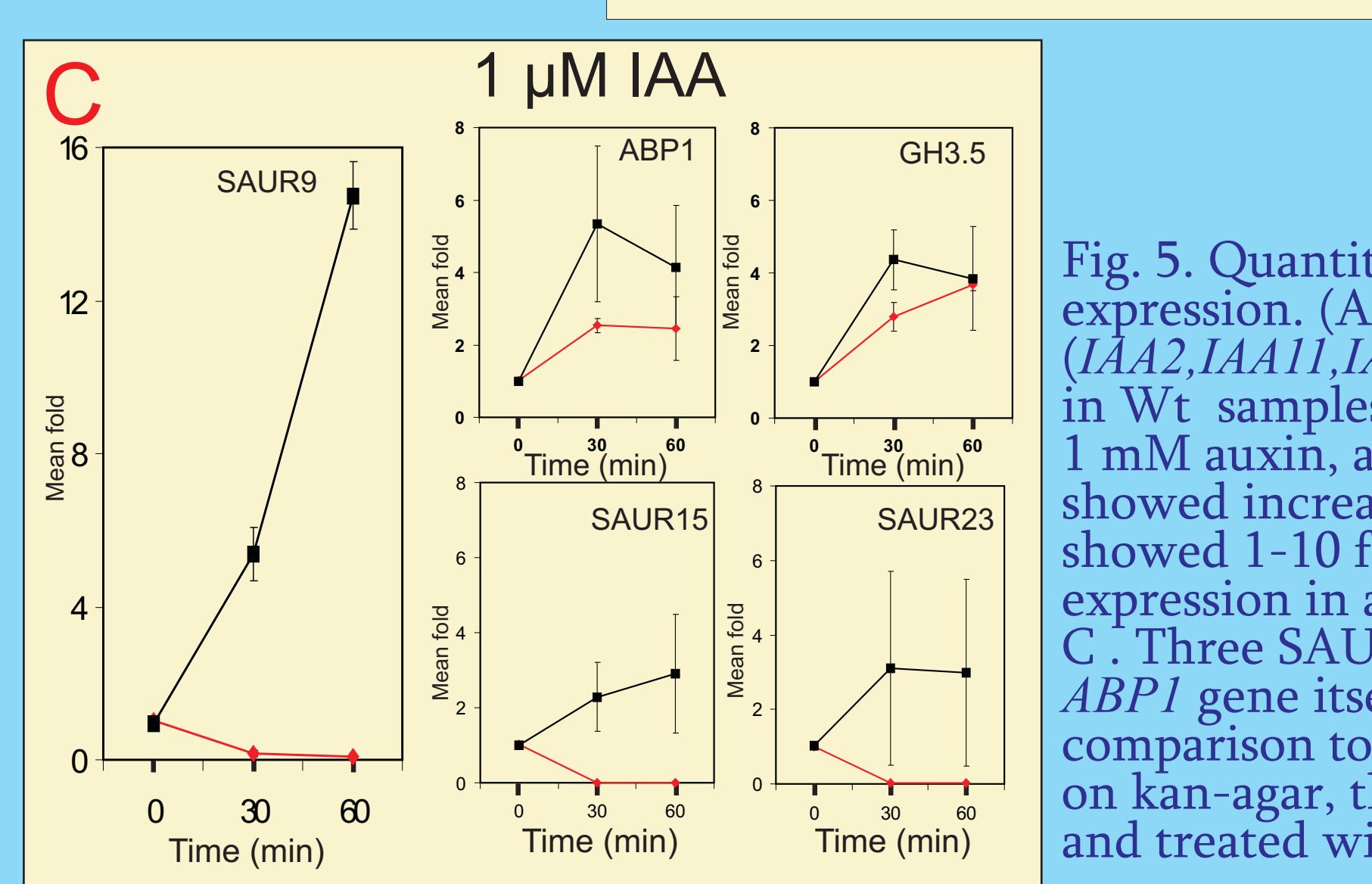
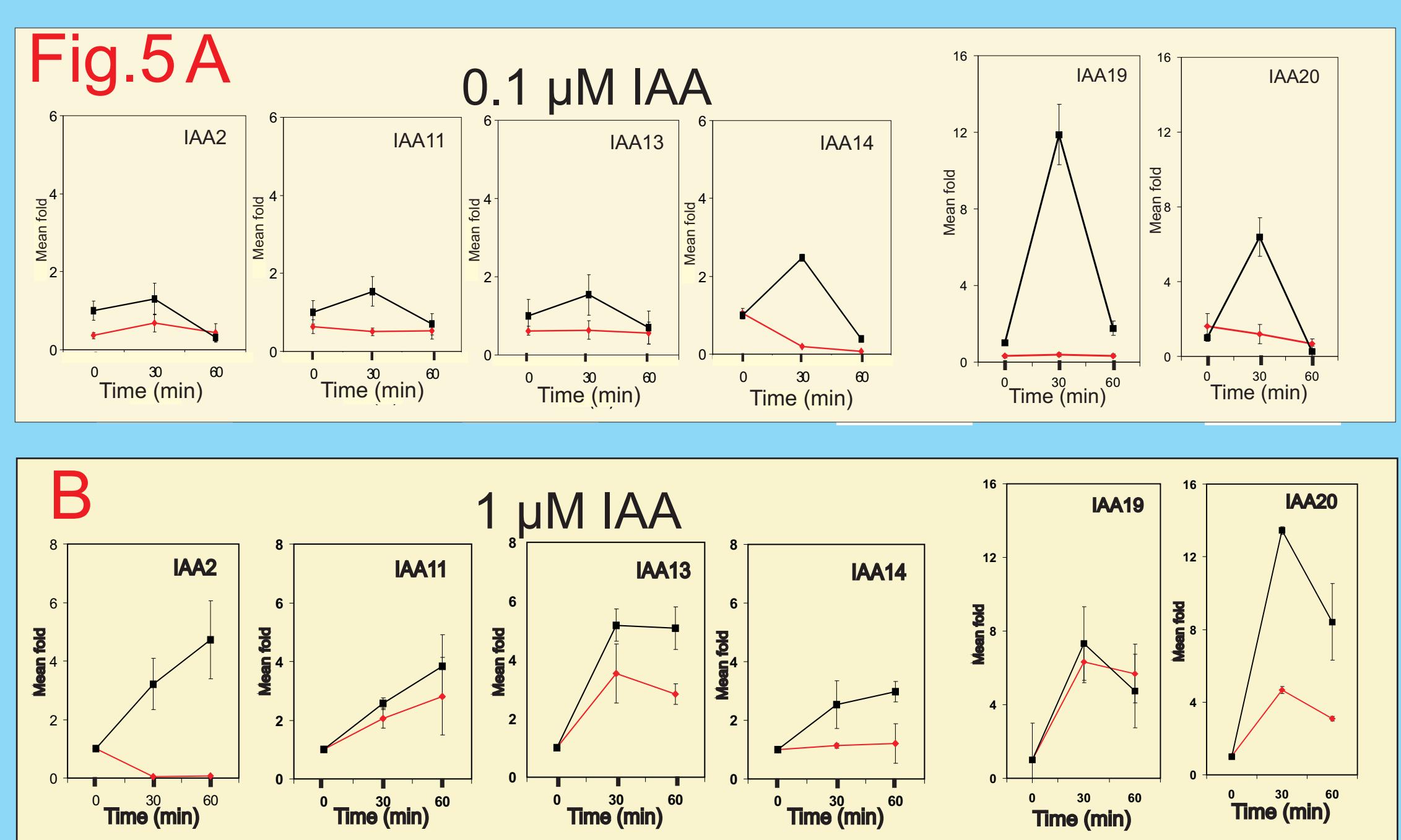


Fig. 5. Quantitative Real Time PCR data of early auxin-induced gene expression. (A) After 30 min 0.1mM auxin treatment, six IAA genes (*IAA2*, *IAA11*, *IAA13*, *IAA14*, *IAA19*, *IAA20*) showed increased expression in Wt samples but not in hemizygous *abp1/ABP1* samples. (B) With 1 mM auxin, after 30 min hemizygous *abp1/ABP1* and Wt samples showed increasing in gene expression in all IAA genes but Wt samples showed 1-10 fold more than hemizygous samples. (C) Increasing expression in another set of early auxin-induced genes is shown in fig. C. Three SAUR genes (*SAUR9*, *SAUR15*, *SAUR23*), *GH3.5* and the *ABP1* gene itself showed also 2-16 fold change different in Wt in comparison to hemizygous *abp1/ABP1* samples. Plants were selected on kan-agar, then grown for 5 d in liquid medium without kanamycin and treated with IAA.

Phenotypes of transformed *abp1_{mut}* mutants containing mutated cDNAs (In the process of selection for eventually double homozygous *abp1/abp1:abp1_{mut}/abp1_{mut}* genetic constitution)

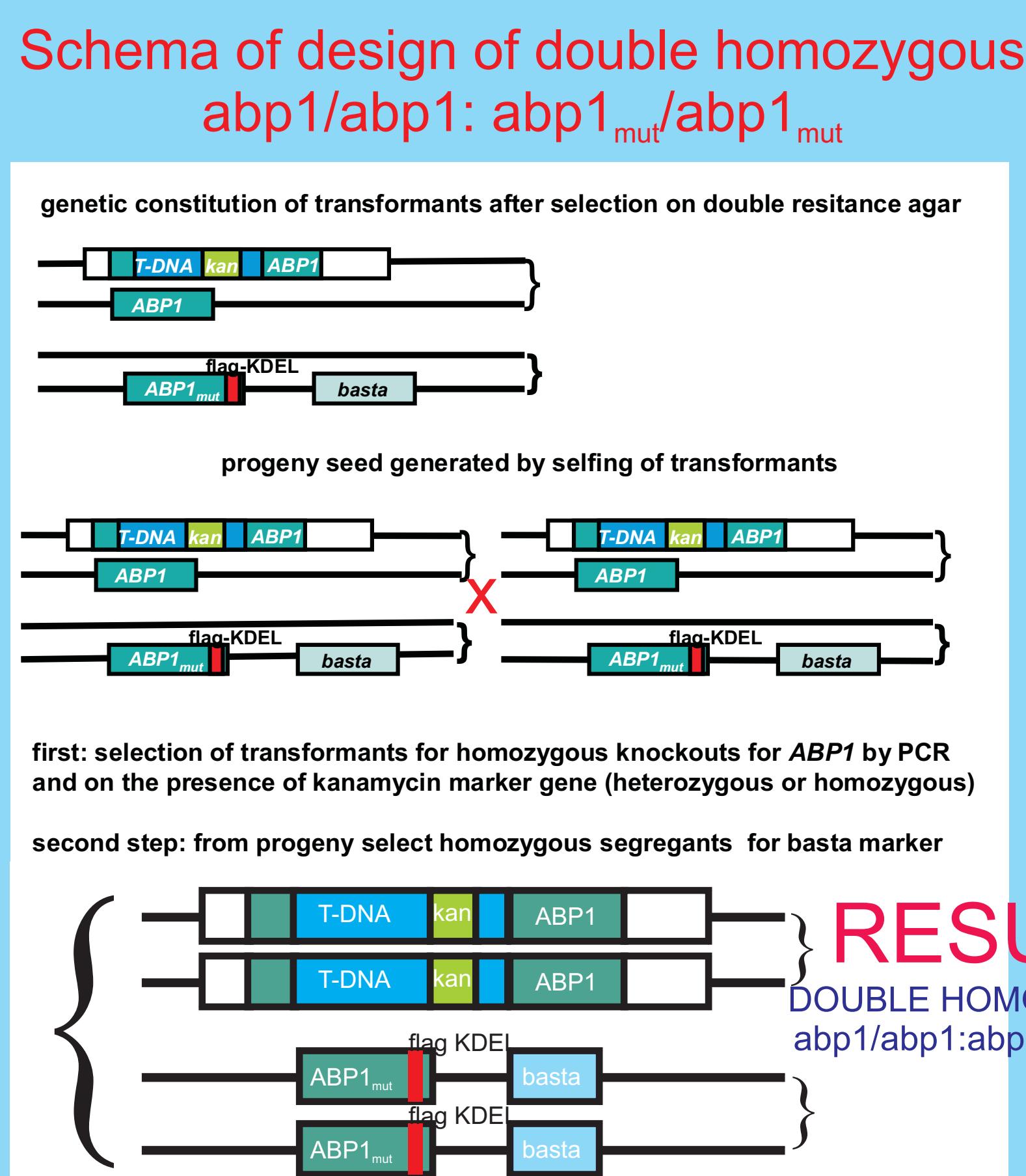
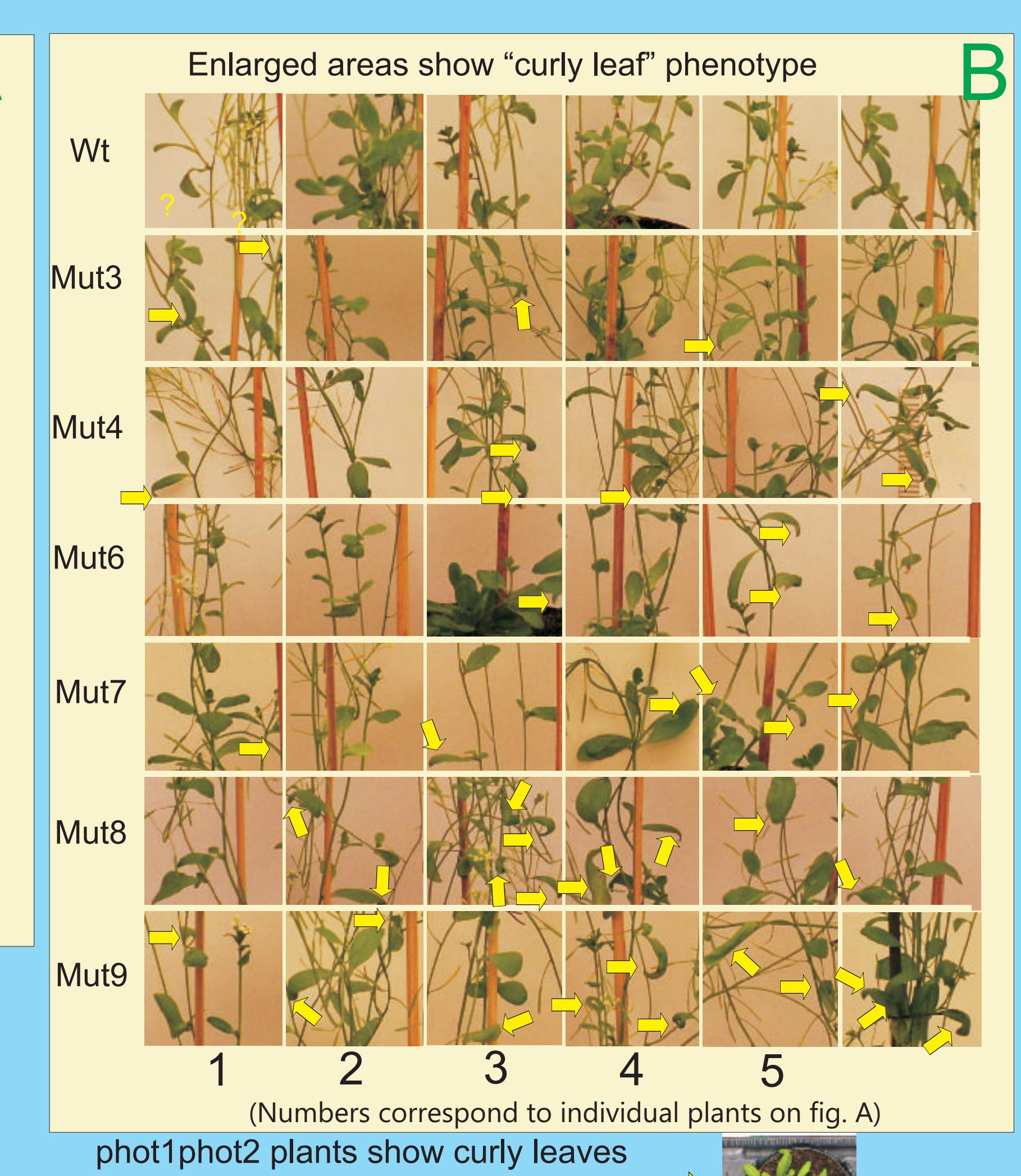
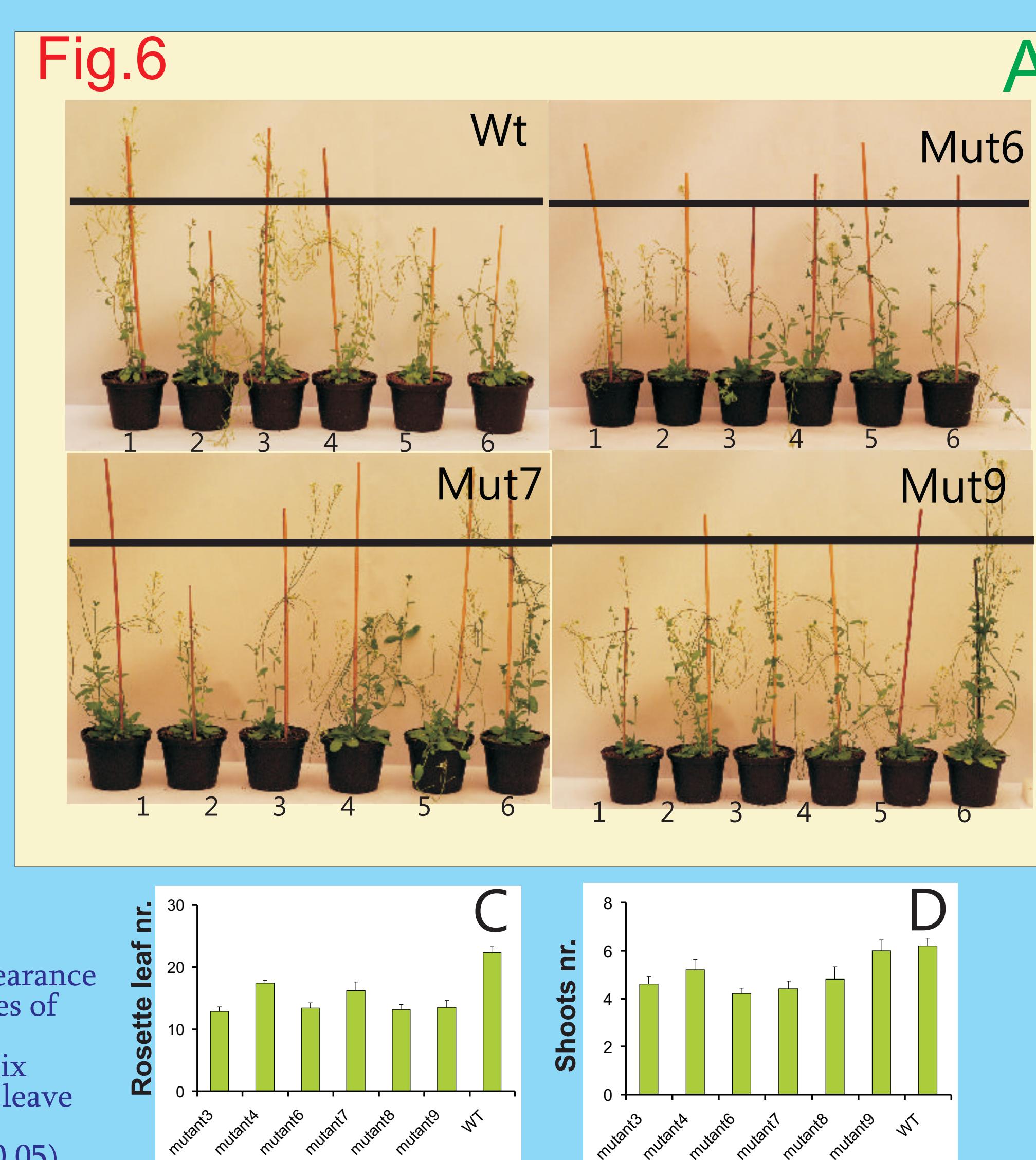


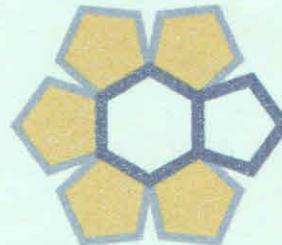
Fig. 6. Features of 80 day old mutant plants growth in LD. General appearance of mutants and Wt plants are shown on fig. A. Fig. B shows detail pictures of six plants of each mutants. Yellow arrows show curly leaves which are reminiscent of *phot1phot2* mutant (see phototropic deficiency above). Six different mutants were investigated and all mutants show fewer rosette leaf numbers in comparison to Wt ($p < 0.05$) (C), indicating early flowering. They also had reduced shoot numbers, especially in mutant 6 and 7 ($p < 0.05$) (D), indicating lower apical dominance.

Conclusion: ABP1 is a powerful receptor which regulates genes, likely with a functional link to TIR1. The hemizygous *abp1/ABP1* mutant is defect in responses requiring polar auxin transport. Early flowering in SD and LD is another property. Our in vitro mutant plants seem to have similar phenotypes.



ACPD 2009

Auxin and Cytokinins in Plant Development
International Symposium
July 10 – 14, 2009, Prague, Czech Republic



LETTER OF CONFIRMATION

This is to confirm that

Yunus effendi

attend the International Symposium of Auxin and Cytokinins in Plant Development,

July 10-14, 2009, Prague, Czech Republic

Organizer

Eva Zažímalová, PhD.

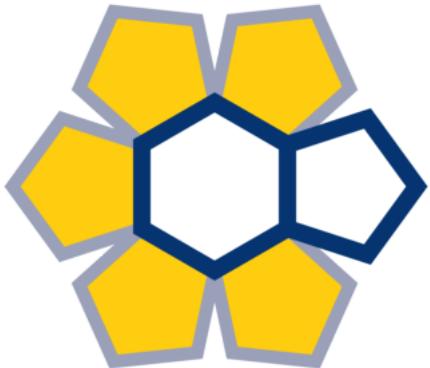
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ACPD 2009

Auxins and Cytokinins in Plant Development
International Symposium
July 10-14, 2009, Prague, Czech Republic

PROGRAMME
BOOK OF ABSTRACTS
LIST OF PARTICIPANTS

ACPD 2009

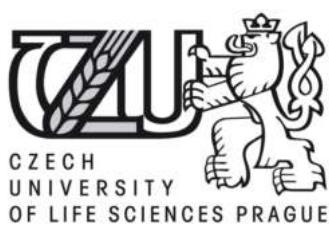
Auxins and Cytokinins in Plant Development
International Symposium
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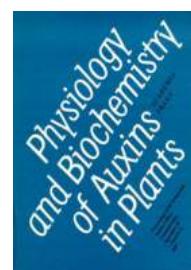
Past meetings



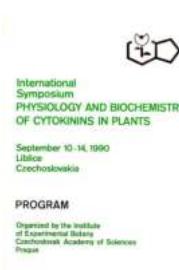
Liblice
September 11-15
1972



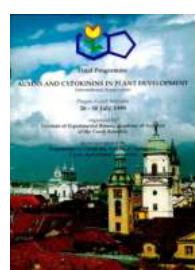
Liblice
June 18-22
1984



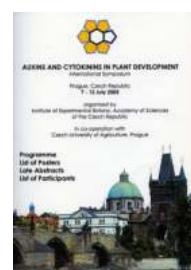
Liblice
September 28-October 2
1987



Liblice
September 10-14
1990



Prague
July 26-30
1999



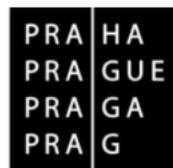
Prague
July 7-12
2005

Table of Contents

Organizing Committee	2
Table of Contents	3
Programme At a Glance	5
Programme	7
Plenary Lectures	13
Session 1: Biosynthesis and Metabolism	15
Session 2: Signalling and Development	29
Session 3: Pattern Formation and Development	47
Session 4: Transport and Development	63
Session 5: Hormone Interactions and Plant Architecture	77
Session 6: Hormones, Environment and Applications	87
Session 7: Modelling and Advanced Methods	101
List of Participants	113
Author Index	121



OPERAČNÍ PROGRAM PRAHA
KONKURENCESCHOPNOST



The Institute of Experimental Botany of the Academy of Sciences of the Czech Republic obtained new equipment that will greatly facilitate its research in molecular and cellular plant biology. Instead of manually, routine laboratory work will now be performed by robots which are faster, more reliable, and more efficient. The equipment was financed by the European Fund for Regional Development via the Operational Programme Prague – Competitiveness.

The Institute purchased three automated systems for processing of plant samples. The systems will be used for isolation and analysis of nucleic acids, for proteomic analyses, and for *in situ* hybridisations and immunohistochemistry.

EVROPSKÝ FOND PRO REGIONÁLNÍ ROZVOJ

PRAHA & EU: INVESTUJEME DO VAŠÍ BUDOUCNOSTI

Programme At a Glance

Friday, July 10

16.00 - 20.00 Registration and poster mounting

Saturday, July 11

08.00 - 08.45	Registration and poster mounting
08.45 - 09.00	Opening of the Symposium
09.00 - 10.30	Plenary lectures
10.30 - 11.00	Coffee
11.00 - 12.35	Session 1: Biosynthesis and Metabolism
12.35 - 14.05	Lunch
14.05 - 15.40	Session 1: Biosynthesis and Metabolism
15.40 - 16.10	Coffee
16.10 - 17.25	Session 2: Signalling and Development
17.30 - 19.30	Poster Session I (P1, P2, P3), light refreshment
19.30 - 21.00	Get-together Party

Sunday, July 12

08.30 - 10.15	Session 2: Signalling and Development
10.15 - 10.45	Coffee
10.45 - 12.00	Session 2: Signalling and Development
12.00 - 13.30	Lunch
13.30 - 15.25	Session 3: Pattern Formation and Development
15.25 - 15.55	Coffee
15.55 - 17.50	Session 3: Pattern Formation and Development
18.00 - 20:00	Poster Session II (P4, P5, P6, P7), light refreshment

Monday, July 13

08.30 - 10.15	Session 4: Transport and Development
10.15 - 10.45	Coffee
10.45 - 12.40	Session 4: Transport and Development
12.40 - 14.10	Lunch
14.10 - 15.55	Session 5: Hormone Interactions and Plant Architecture
15.55 - 16.25	Coffee
16.25 - 17.40	Session 5: Hormone Interactions and Plant Architecture
17.50	Departure to Liblice
19.00 - 23.00	Congress Dinner at Liblice Castle

Tuesday, July 14

08.30 - 10.05	Session 6: Hormones, Environment and Applications
10.05 - 10.35	Coffee
10.35 - 12.30	Session 6: Hormones, Environment and Applications
12.30 - 14.00	Lunch
14.00 - 15.50	Session 7: Modelling and Advanced Methods
15.50 - 16.20	Coffee
16.20 - 18.10	Session 7: Modelling and Advanced Methods
18.10 - 18.30	Closing of the Symposium
18.30 - 22.00	Farewell Party

ACPD 2009 Programme

Friday, July 10

16.00 - 20.00 Registration and poster mounting

Saturday, July 11

08.00 - 08.45 Registration and poster mounting
08.45 - 09.00 Opening of the Symposium

Plenary lectures

Chair: Miroslav Kamínek

09.00 - 09.45 Auxin transport - connecting cell polarity and patterning
Jiří Friml, VIB, Ghent University, Belgium

09.45 - 10.30 Cytokinin signaling: Two components and more
Joseph Kieber, University of North Carolina, Chapel Hill, NC, USA

10.30 - 11.00 Coffee

Session 1: Biosynthesis and Metabolism

Chair: Karin Ljung

11.00 - 11.35 O1-1 Cytokinin biosynthesis pathway: not as simple as it looks
Hitoshi Sakakibara, RIKEN Plant Science Center, Yokohama, Japan
OICheIm Honorary Lecture

11.35 - 11.55 O1-2 Cytokinin interconversion is disrupted by adenosine kinase deficiency
Barbara Moffatt, University of Waterloo, Canada

11.55 - 12.15 O1-3 Structural characterization of cytokinin oxidase/dehydrogenase mutants
David Kopečný, INRA, France and Palacký University, Olomouc, Czech Republic

12.15 - 12.35 O1-4 Cis-zeatins in plants: their distribution, bioactivities, transport and metabolism
Václav Motyka, Institute of Experimental Botany AS CR, Prague, Czech Republic

12.35 - 14.05 Lunch

Chair: Hitoshi Sakakibara

14.05 - 14.40 O1-5 Regulation of auxin and cytokinin metabolism during *Arabidopsis* root development
Karin Ljung, Umeå Plant Science Centre, Sweden
OICheIm Honorary Lecture

14.40 - 15.00 O1-6 Proteomics and metabolomics of cytokinin-induced bud formation in *Physcomitrella patens*
Anika Erxleben, University of Freiburg, Germany

15.00 - 15.20 O1-7 Oxylipins contribute to the transcriptional regulation of YUC8 and YUC9, thereby controlling local auxin biosynthesis in *Arabidopsis thaliana*
Stephan Pollmann, Ruhr-University Bochum, Bochum, Germany

- 15.20 - 15.40 O1-8 **Auxin amidohydrolases from *Brassica rapa* cleave conjugates of indole propionic and indole butyric acid as preferable substrates: a biochemical and modelling approach**
Jutta Ludwig-Müller, Technische Universität Dresden, Dresden, Germany

15.40 - 16.10 Coffee

Session 2: Signalling and Development

Chair: Tatsuo Kakimoto

- 16.10 - 16.45 O2-1 **Interpreting the tracks of cytokinin signaling during *Arabidopsis* gametophyte and embryo development**
Bruno Müller, Harvard Medical School, Boston, USA and University of Zürich, Switzerland

- 16.45 - 17.05 O2-2 **Analysis of cytokinin receptor specificity in *Arabidopsis thaliana***
Michael Riefler, Freie Universität Berlin, Germany

- 17.05 - 17.25 O2-3 **Cytokinin response factors in *Arabidopsis* and tomato**
Aaron M. Rashotte, Auburn University, Auburn, AL, USA

17.30 - 19.30 **Poster Session I (P1, P2, P3)**, light refreshment. Posters with odd and even numbers should be presented from 17.30 to 18.30 and from 18.30 to 19.30, respectively.

19.30 - 21.00 Get-together Party

Sunday, July 12

Chair: Mark Estelle

- 08.30 - 09.05 O2-4 **The TAF-related protein CKH1 and the chromatin remodeling-factor CKH2 negatively regulate cytokinin-induced callus formation in *Arabidopsis***
Tatsuo Kakimoto, Osaka University, Japan
- 09.05 - 09.35 O2-5 **Histidine kinases CKI1, AHK2 and AHK3 control vascular tissue development in *Arabidopsis* shoots**
Ilwoo Hwang, Pohang University of Science and Technology, Pohang, Korea
- 09.35 - 09.55 O2-6 **Early cytokinin response proteins and phosphoproteins of *Arabidopsis thaliana***
Martin Černý, Mendel University of Agriculture and Forestry & Institute of Biophysics AS CR, v.v.i., Brno, Czech Republic

- 09.55 - 10.15 O2-7 **The *Arabidopsis* cytokinin response is mediated by tissue-specific transcriptional cascades**
Eric G. Schaller, Dartmouth College, Hanover, NH, USA

10.15 - 10.45 Coffee

Chair: Bruno Müller

- 10.45 - 11.20 O2-8 **Auxin signaling: A short (but complex) pathway**
Mark Estelle, The University of California, CA, USA
- 11.20 - 11.40 O2-9 **A cellular expression map of the auxin response factor family reveals cell type-specific auxin responses**
Barbara Möller, Wageningen University, Wageningen, The Netherlands

- 11.40 - 12.00 O2-10 **Activation mechanism of patatin-related phospholipase A by phosphorylation and function of phospholipases A in auxin and light signaling**
Günther F.E. Scherer, University Hannover, Hannover, Germany

12.00 - 13.30 Lunch

Session 3: Pattern Formation and Development

Chair: Sabrina Sabatini

- 13.30 - 14.05 O3-1 **Integration of hormonal and genetic regulation during vascular morphogenesis in Arabidopsis**
Ykä Helariutta, University of Helsinki, Finland

- 14.05 - 14.25 O3-2 **Molecular analysis of auxin regulation of wood formation**
Rishikesh P. Bhalerao, Umeå Plant Science Center, Umeå, Sweden

- 14.25 - 14.45 O3-3 **DORNROESCHEN and DORNROESCHEN-LIKE function with the CUC genes and MP to modulate embryo symmetry via auxin-dependent pathways**
John W. Chandler, Cologne, Germany

- 14.45 - 15.05 O3-4 **Multiple monopteros-dependent pathways are involved in leaf initiation**
Jim Mattsson, Simon Fraser University, Canada

- 15.05 - 15.25 O3-5 **Auto-regulated expression of cytokinin biosynthesis confers drought tolerance in plants**
Shimon Gepstein, Faculty of Biology, Technion, Haifa, Israel

15.25 - 15.55 Coffee

Chair: Ykä Helariutta

- 15.55 - 16.30 O3-6 **A genetic framework for the auxin/cytokinin control of cell division and differentiation in the root meristem**
Sabrina Sabatini, Sapienza University of Rome, Italy

- 16.30 - 16.50 O3-7 **The role of cytokinin response factors during lateral root initiation**
Giel van Noorden, VIB, Ghent University, Belgium

- 16.50 - 17.10 O3-8 **KNOXI genes and cytokinin regulate leaf development**
Naomi Ori, The Hebrew University of Jerusalem, Rehovot, Israel

- 17.10 - 17.30 O3-9 **Small RNAs facilitate polarity and laminar growth of tomato leaves**
Tamar Yifhar, The Weizmann Institute of Science, Rehovot, Israel

- 17.30 - 17.50 O3-10 **Cytokinins can stimulate Arabidopsis hypocotyl elongation at decreased light intensity**
Alena Reková, Mendel University of Agriculture and Forestry and Institute of Biophysics AS CR, v.v.i., Brno, Czech Republic

18.00 - 20:00 **Poster Session II (P4, P5, P6, P7)**, light refreshment. Posters with odd and even numbers should be presented from 17.30 to 18.30 and from 18.30 to 19.30, respectively.

Monday, July 13**Session 4: Transport and Development****Chair: René Benjamins**

08.30 - 09.05	O4-1	Lateral root development: an emerging story... Malcolm J. Bennett, University of Nottingham, UK
09.05 - 09.35	O4-2	Comparison of transport activity and interactions of ABCB, AUX1, and PIN auxin transporters Angus S. Murphy, Purdue University, West Lafayette IN, USA
09.35 - 09.55	O4-3	Auxin influx carriers are involved in regulating apical hook development of Arabidopsis Filip Vandenbussche, Ghent University, Ghent, Belgium
09.55 - 10.15	O4-4	PINOID controls PIN1 polar targeting through evolutionarily conserved phosphoserines Fang Huang, Institute of Biology, Leiden University, Leiden, The Netherlands
10.15 - 10.45		Coffee
		Chair: Malcolm J. Bennett
10.45 - 11.20	O4-5	Up and down and all around: PIN polarity regulation in Arabidopsis René Benjamins, University of Utrecht, Utrecht, The Netherlands
11.20 - 11.40	O4-6	Mechanistic framework for polar PIN targeting Jürgen Kleine-Vehn, VIB , University Gent, Gent, Belgium
11.40 - 12.00	O4-7	The NPA-binding protein TWISTED DWARF1 controls ABCB-mediated auxin transport Hanna Valpuri Soviero, University of Zurich and Zurich-Basel Plant Science Center, Zurich, Switzerland
12.00 - 12.20	O4-8	Post-transcriptional control of PIN expression by an <i>Arabidopsis thaliana</i> elongator complex Johannes Leitner, University of Natural Resources and Applied Life Sciences, Vienna, Austria
12.20 - 12.40	O4-9	ROCK1 encodes a putative transport protein of unknown function Tomáš Werner, Free University Berlin, Germany
12.40 - 14.10		Lunch

Session 5: Hormone Interactions and Plant Architecture**Chair: Christine A. Beveridge**

14.10 – 14.45	O5-1	Long range signalling in the control of shoot branching Ottoline Leyser, University of York, York, UK
14.45 – 15.15	O5-2	Auxin - cytokinin interaction shaping root architecture Eva Benková, VIB, University Gent, Belgium

15.15 - 15.35	O5-3	Apical dominance is controlled by interaction between cytokinin biosynthesis/degradation and auxin in stem Hitoshi Mori, Nagoya University, Nagoya, Japan
15.35 – 15.55	O5-4	Cytokinins modulate auxin-induced organogenesis in plants via regulation of the auxin efflux Markéta Pernisová, Masaryk University, Brno, Czech Republic
15.55 - 16.25		Coffee Chair: Ottoline Leyser
16.25 - 17.00	O5-5	Regulation of axillary bud outgrowth by strigolactones Christine A. Beveridge, University of Queensland, Brisbane, Australia
17.00 - 17.20	O5-6	Spatial and temporal regulation of auxin and cytokinin gene expression and responses in pea ramosus mutants Colin Turnbull, Imperial College London, London, UK and University of Massachusetts, Amherst, MA, USA
17.20 - 17.40	O5-7	Competitive canalization of PIN-dependent auxin flow from axillary buds controls apical dominance in pea Jozef Balla, Mendel University of Agriculture and Forestry, Brno, Czech Republic
17.50		Departure to Liblice
19.00 - 23.00		Congress Dinner at Liblice Castle

Tuesday, July 14

Session 6: Hormones, Environment and Applications

		Chair: Thomas Schmülling
08.30 - 09.05	O6-1	The importance of plant biotechnology for society and environment Marc Van Montagu, Ghent University, Ghent, Belgium
09.05 - 09.25	O6-2	Characterization and biological activity of novel purine-derived inhibitor of cytokinin oxidase/dehydrogenase INCYDE and its potential use for in vivo studies Lukáš Spíchal, IEB AS CR & Palacký University, Olomouc, Czech Republic
09.25 - 09.45	O6-3	Light/PHOT1-dependent polar translocation of PIN3 auxin carrier during phototropisms in Arabidopsis Zhaojun Ding, VIB, Ghent University, Ghent, Belgium
09.45 - 10.05	O6-4	Cytokinin regulates sodium homeostasis Michael Mason, University of Queensland, Australia
10.05 - 10.35		Coffee Chair: Marc Van Montagu
10.35 - 11.10	O6-5	Applied perspective of cytokinin-mediated growth modulation in crop plants Thomas Schmülling, Free University of Berlin, Germany

11.10 - 11.30	O6-6	Molecular and functional analyses of changes in the pedicel abscission zone transcriptome following auxin depletion Shimon Meir, ARO, The Volcani Center, Bet-Dagan, Israel
11.30 - 11.50	O6-7	Cytokinin signalling in <i>Medicago truncatula</i> root and nodule organogenesis Florian Frugier, Institut des Sciences du Végétal, CNRS, Gif-sur-Yvette, France
11.50 - 12.10	O6-8	Comparison of cytokinin role in drought and heat stress response of tobacco plants Radomíra Vařková, Institute of Experimental Botany AS CR, Prague, Czech Republic
12.10 - 12.30	O6-9	Metabolism and possible function of cytokinin during abiotic stress in maize Petr Galuszka, Palacký University & Institute of Experimental Botany AS CR, Olomouc, Czech Republic
12.30 - 14.00		Lunch

Session 7: Modelling and Advanced Methods

		Chair: Przemek Prusinkiewicz
14.00 - 14.35	O7-1	Quantitative approaches to plant development Cris Kuhlemeier, University of Bern, Switzerland
14.35 - 15.10	O7-2	A computational model of phyllotaxis in Costus Przemek Prusinkiewicz, University of Calgary, Canada
15.10 - 15.30	O7-3	Agent based modelling of auxin transport canalisation Philip Garnett, University of York, York, UK
15.30 - 15.50	O7-4	Towards a model of auxin response in root epidermis Martin Kieffer, University of Leeds, UK
15.50 - 16.20		Coffee
		Chair: Cris Kuhlemeier
16.20 - 16.50	O7-5	Modelling of auxin transport processes on a single cell level Klára Hoyerová, Institute of Experimental Botany AS CR, Prague, Czech Republic
16.50 - 17.10	O7-6	Modelling of positive-feedback mechanism for auxin carrier polarization during auxin-dependent plant development Krzysztof Wabnik, VIB, Ghent University, Ghent, Belgium
17.10 - 17.30	O7-7	Developing a real-time, quantitative biosensor for auxin and ABA Richard Napier, University of Warwick, UK
17.30 - 17.50	O7-8	Highly sensitive and high-throughput analysis of plant hormones using MS-probe modification and UPLC-ESI-qMS/MS: an application for hormone profiling in <i>Oryza sativa</i> Hitoshi Sakakibara, RIKEN Plant Science Center, Yokohama, Japan
17.50 - 18.10	O7-9	New purification and mass spectrometric approach for cytokinin analysis Ondřej Novák, Palacký University & Institute of Experimental Botany, Olomouc, Czech Republic
18.10 - 18.30		Closing of the Symposium
18.30 - 22.00		Farewell Party

P2-5 AUXIN-BINDING PROTEIN1 (ABP1), THE SECOND AUXIN RECEPTOR

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Despite of knowing the 3-dimensional structure ABP1 is not fully acknowledged as an auxin receptor. We used the ABP1 insertional mutant (Chen et al. 2001). It is lethal when homozygous but viable in the hemizygous *abp1/ABP1* state. Hemizygous plants produce 2:1 resistant:wild type progeny on kanamycin agar due to the T-DNA. Seedlings from *abp1/ABP1* plants are defect in phototropism and gravitropism of roots and shoots. Those populations are composed of a major slow reacting and a minor normal reacting group. *abp1/ABP1* seedlings show strong root slanting, longer hypocotyls, and slightly increased lateral root number. Root auxin responses in *abp1/ABP1* seedlings are slightly less sensitive than in wt. In short days and long days *abp1/ABP1* plants flower earlier. They have more branches and decreased main stem diameter, indicating decreased apical dominance. Auxin-induced genes (qPCR: IAA2, IAA11, IAA13, IAA14, IAA19, IAA20) respond to auxin (0.1µM/1µM/10µM) 2-10 fold stronger in wt than in *abp1/ABP1* seedlings (30 & 60 min). Thus ABP1 is a receptor with probable functions in auxin transport and gene regulation. The apparent functional link to TIR1-linked gene regulation could be provided by phospholipase A (Scherer et al., 2007)

P2-7 THE ROLE OF FUSICOCCINE-LIKE SECONDARY HORMONE IN THE CYTOKININE SIGNAL TRANSDUCTION.

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It was shown that cytokinine causes the formation of cytokinine secondary hormone (CSH) in embryos of germinating wheat seeds. CSH was purified by chromatography on nanostructured carbon sorbent "Nanocarbosorb". It was established by mass-spectra that CSH related to fusicoccine. The CSH showed the typically cytokinine activities such as: the derepression of apical dominance, the greening of yellow leaves and synthesis of amaranthin. CSH was active at concentration 1000 times less at 2-3 times quicker, than cytokinine. The one of interesting property of CSH is its ability to increase the tolerance of germinating wheat seeds to salt stress. We developed very interesting enzyme sensor model for investigation of signal transduction of cytokinine. It was established that cytokinine causes the formation of NADP-GDh in aleurone layer of wheat seeds. We suggest the next scheme of signal transduction of cytokinine. First step is the formation of CSH. Then molecules of CSH are binded with fusicoccine receptors of plasmatic membrane. This let to increase the level cytosolic Ca²⁺. The last step of signal transduction is switching on the activity of protein kinase C. But this process demands the present of another low molecular regulator which is formed under the effect of CSH on wheat seeds embryos.

P2-6 LIGHT ALTERS PLANT ELONGATION RESPONSES TO EXOGENOUS AUXIN

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Many fundamental issues of interaction between light and hormone signaling pathways involved in plant growth remain to be uncovered. In model plants *Arabidopsis*, tomato and maize we investigated effects of light on plant growth responses to exogenous auxins. In dark, blue light (BL) and red light (RL), exogenous auxin inhibits long-term growth in intact *Arabidopsis* and tomato hypocotyl, and in corn coleoptile. Compared to dark- and RL-grown plants, inhibitory effect of auxin on elongation of *Arabidopsis* hypocotyl developed in BL is weak. Mutant analyses revealed that CRY1 mediates Blurred reduction of hypocotyl sensitivity to exogenous auxin, and that ZTL1 is required for maintenance of hypocotyl response to exogenous auxin in BL and RL. Photoreceptor CRY1 is also involved in BL- and RL-induced reduction of hypocotyl sensitivity to NAA in tomato. Data indicate that tomato hypocotyl responses to the inhibitory effects of NAA and 2,4-D are regulated by light via different mechanisms. Analysis of *elm1* mutant in corn indicated that phytochromes mediate the Blurred RL-induced decline in coleoptile response to exogenous auxin. Our results confirmed the existence of interaction between light and auxin signaling in plant growth. Analyses also suggest the existence of diverse mechanisms of the cross-talk between light and auxin in different plant species.

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P2-8 UNCOVERING THE DISTINCT ROLES OF AUXIN SIGNALING F-BOX (AFB) 4 AND 5 AS AUXIN RECEPTORS

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The auxin receptor family is comprised of six members; TIR1 and AFB1-5. Phylogenetic analysis reveals that the AFB4/5 clade diverged from the other members before seed plant radiation whereas the TIR1/AFB1 and AFB2/3 clades diverged within the angiosperm lineage (Prigge & Estelle, unpublished). The conservation of these receptors across seed plants suggests that they maintain a distinct function. Our goal is to understand the diverse functions of AFB4/5 in relation to other members of the family. Preliminary studies reveal that picloram works specifically through AFB4/5. The *afb4-2* and *afb5-5* single mutants are resistant to picloram compared to wild type while *tir1-1* is not. Biochemical analysis confirms that picloram enhances the affinity of Aux/IAA with AFB4/5 but not with TIR1. The basis for this specificity remains unknown. The *afb4-2afb5-5* double displays hypersensitivity to root growth at 29C, a condition that results in increased levels of auxin biosynthesis. In contrast, the *tir1-1afb2-3* mutants are resistant at 29C. To improve our understanding of TIR1/AFB function we are generating and characterizing all mutant combinations in conjunction with an investigation of the biochemical properties of AFB4/5 compared to TIR1.

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Author Index

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Alvarez, J.	55	Choi, Y.I.	58	Geisler, M.	69
Amsellem, Z.	55	Choi, K.S.	58	Geiss, G.	45
Ananiev, E.D.	96	Chriqui, D.	58	Gepstein, A.	51
Ananieva, K.	96	Christian, M.	42	Gepstein, S.	51
Andreev, I.	42	Cole, M.	49	Gessler, A.	20
Aoyama, T.	52, 85	Comelli, P.	49	Gilmanov, M.K.	40
Arbeiter, A.	30	Costantino, P.	52, 85	Girault, T.	39
Argueso, C.	14	Crespi, M.	93	Goertzen, L.R.	31
Argyros, R.D.	35	Cutcliffe, J.W.	31	Gouzy, J.	93
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Arite, T.	85	Černý, M.	34	Gratão, P.L.	96
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Bartrina, I.	39, 57, 71	Dhonukshe, P.	74	Hansen-Møller, J.	61
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Bradáčová, A.	25	Fellner, M.	39, 40, 59	Immanen, J.	47
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Burke-West, C.	24	Frank, W.	44	Jelínková, A.	73
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Calderon-Villalobos L.I.	36	Friml, J.	13, 57, 59, 61, 68, 69, 72, 72, 72, 73,	Jones, B.	45
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Chandler, J.W.	49	Galuszka, P.	26, 26, 62, 88, 95	Kalousek, P.	83
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Chiang, Y. H.	35			Karady, M.	59, 110
Choe, G.	36				

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Kleine-Vehn, J.	68, 73, 74, 75, 89, 105	Meir, S.	85, 92	Priya, D.	98
Klemš, M.	25	Mellor, N.	63	Procházka, S.	25, 83
Klíma, P.	18, 73, 80, 84, 106	Middleton, A.	63, 104	Prusinkiewicz, P.	102
Klumpler, T.	41	Mikulík, J.	59, 110	Punwani, J.	14
Kociánová, A.	25	Minkina, Y.	86	Rademacher, E.H.	37
Kochanek, B.	92	Mirams, G.	104	Rameau, C.	81, 84
Kojima, M.	58, 108	Mishev, K.	96	Rashotte, A.M.	31, 53
Kolář, J.	23	Mizutani, M.	108	Rasmussen, H.N.	61
Köllmer, J.	25	Moffatt, B.	16	Raspor, M.	84
Kolouchová, T.	41	Möller, B.	37	Raz, V.	59, 65
Komatsu, H.	108	Monteiro, C.C.	96	Reid, M.S.	92
Kopečný, D.	17, 88	Mori, H.	79	Reichman, P.	80
Koukalová, Š.	34	Morita, M.T.	52, 85, 89	Reinol, V.	83
Kovaleva, L.	42, 86	Motte, H.	111	Reková, A.	56
Kowalczyk, M.	60	Motyka, V.	18, 23, 26, 26, 27, 84, 84, 94, 96	Reski, R.	20, 44
Kowalska, M.	26, 111	Moubayidin, L.	52, 85	Ricci, A.	60
Krämer, U.	99	Mravec, J.	75	Riefler, M.	30, 44, 97
Krasavin, E.A.	96	Müller, B.	29	Rietz, S.	38
Křeček, P.	74	Müller, D.	85	Riov, J.	85
Kubeš, M.	73, 73, 74	Murphy, A.S.	64, 72, 98	Rivero, R.	51
Kubo, M.	32	Mustroph, A.	58	Robert, S.	74
Kudaibergenov, K.K.	40	Nakamura, K.	52, 85	Rolčík, J.	39, 39, 59, 111
Kuhlemeier, C.	101	Napier, R.	107, 111	Roll, E.	60
Kulaeva, O.N.	45	Napsucialy-Mendivil, S.	57	Romanov, G.A.	30, 42
Kuroha, T.	108	Neumannová, I.	56	Růžička, K.	47, 61, 78
Kusnetsov, V.V.	86	Neve, J.	43	Ryu, H.	33
Kyozuka, J.	85	Niemann, M.	71	Rehulka, J.	40
Laloue, M.	17	Niemenen, K.	47	Sabatini, S.	52, 85
Laňková, M.	73, 74, 106	Ninković, S.	84	Sabban, M.	55
Larrieu, A.	63	Nisler, J.	43, 44	Sakakibara, H.	15, 42, 79, 108
Lavy, M.	36, 42	Nitschke, S.	97	Salopek-Sondi, B.	22, 111
Lea, P.J.	96	Nodzyński, T.	75	Salt, D.	90
Leduc, N.	39	Noh, E.W.	58	Sato-Shimizu, S.	79
Lee, G.J.	98	Novák, J.	98	Sauer, M.	61
Lehesranta, S.	47	Novák, O.	23, 24, 25, 26, 59, 94, 95, 109, 110	Savić, B.	22
Leitner, J.	70	Nørbaek, R.	61	Sedlářová, M.	26
Lenobel, R.	109	Offringa, R.	66	Sehr, E.M.	44
Lers, A.	92	Oppermann, E.	38	Seifertová, D.	74
Leyser, O.	77, 85, 103	Ördög, V.	25	Shahar, G.	55
Liere, K.	45	Ori, N.	54	Shani, E.	54
Lifschitz, E.	59	Orman, B.	60	Shao, R.	36
Lichtenberger, R.	47	Otegui, M.S.	98	Shi, X.	31
Lindberg, S.	43	Ottó, E.	57	Shishkova, S.	57
Lindner, A.C.	26	Paciorek, T.	74	Shishova, M.	43
Liput, C.	57	Páčurár, D.J.	60	Schaller, G.E.	35, 90
Ljung, K.	19, 45, 104, 110	Páčurár, M.L.	60	Schenck, D.	42
Lokerse, A.S.	37	Palme, K.	33	Scherer, G.F.E.	27, 38, 40
Lomin, S.N.	30, 42	Parker, J.E.	38	Scheres, B.	67
Long, C.	58	Pavlú, J.	98	Schlosser, A.	20
Loose, M.	63	Peer, W.A.	98	Schmülling, T.	25, 30, 39, 44, 57, 57, 58, 71, 88, 91, 97, 99
Lubovská, Z.	94	Pejchar, P.	73	Schnurmacherová, D.	24
Ludwig-Müller, J.	22	Pekárová, B.	33, 41, 43	Schoor, S.	16
Lukšanová-Fuksová, H.	97	Pekker, I.	55, 58	Schuetz, M.	50
Luschnig, C.	70	Peled, D.	55	Schwambach, J.	60
Lüthen, C.H.	42	Pelleschi-Travier, S.	39	Schwarz, M.	44
MacNish, A.J.	92	Pěnčík, A.	39, 59, 111	Simon, S.	73, 74
Madzak, C.	17	Pepper, L.C.	31	Skúpa, P.	72, 75
Maekawa, M.	85	Peres, L.E.P.	60, 96	Slováková, L.	24
Magnus, V.	22, 111	Peret, B.	63	Slováková, K.	26
Machida, Y.	58	Perilli, S.	52, 85	Souček, P.	23, 25, 33, 56, 80, 97
Machida, C.	58	Pernisová, M.	80, 84	Sovero, V.	69
Máčková, P.	59, 110	Pešek, B.	65	Spíchal, L.	43, 44, 58, 88
Majira, A.	17	Petersson, S.V.	104, 110	Stepney, S.	103
Makam, S.N.	98	Petrášek, J.	59, 65, 72, 73, 73, 73, 74, 74, 75, 106	Stirk, W.A.	25
Malá, J.	59, 110	Philosoph-Hadas, S.	85, 92	Street, I.H.	35
Malbeck, J.	80, 94, 97	Pils, B.	41	Strnad, M.	25, 25, 26, 43, 59, 71, 88, 109, 110, 110, 111
Malínská, K.	73	Pino-Nunes, L.E.	60		
Mancuso, S.	69, 75				
Marečková, M.	97				
Marek, J.	41, 43				

Suer, S.	44	Yang, H.	64
Sundaresan, S.	92	Yemelyanov, V.	43
Suzuki, K.	108	Yevdakova, N.	26
Swarup, R.	65	Yifhar, T.	55
Synek, L.	72	Yonekura-Sakakibara, K.	42
Szűčová, L.	110	Yoshida, S.	57
Šebela, M.	17, 26	Young, N.	82
Šimášková, M.	78	Yu, H.	36
Šmehilová, M.	26	Zago, M.K.	66
Štorchová, H.	23, 94	Zakharova, E.	86
Tafesse, F.G.	38	Zalabák, D.	40
Takahashi, H.	58	Zatloukal, M.	43, 88
Takei, K.	108	Zažímalová, E.	65, 72, 73, 73, 73, 73, 74, 74, 75, 80, 106
Tanaka, M.	79	Zhang, J.	72, 75
Taniguchi, M.	52, 85	Zhao, Y.	21
Tarasova, O.	26	Zintl, S.	44
Tarkowski, P.	26, 111	Zolla, G.	45
Tasaka, M.	57, 89	Zubo, Y.O.	45, 86
Teige, M.	38	Zwiewka, M.	69, 75
Tejos, R.	61	Žádníková, P.	59, 65
Thélier-Huché, L.	39	Žárský, V.	72, 75
Tian, F.	111	Žídek, L.	43
Timofeeva, G.	42	Žížková, E.	18, 27
Titapiwatanakun, B.	64, 98		
To, J.	14		
Tomášová, R.	96		
Tomič, S.	21		
Trávníčková, A.	84		
Trčková, M.	23		
Třísková, O.	43		
Turčinov, H.	26		
Turečková, V.	94, 95		
Turnbull, C.	82		
Ueguchi-Tanaka, M.	108		
Ueno, Y.	58		
Umehara, M.	85		
Ursache, R.	47, 61		
Uřinovská, J.	44		
Václavíková, K.	26, 95		
Vaclavová, T.	40		
Válková, M.	80		
van der Berg, H.	107		
van der Klis, H.	67		
van der Straeten, D.	59, 65		
van Marion, A.	66		
van Montagu, M.	87		
van Noorden, G.	31, 53		
van Staden, J.	23, 25		
Vandenbussche, F.	59, 65		
Vaňková, R.	23, 94, 97, 110		
Vanneste, S.	53, 72		
Veierskov, B.	61, 98		
Verdenaud, M.	93		
Vervliet-Scheebaum, M.	20, 44		
Vijay Selvaraj, K.S.	92		
Viémont, J.-D.	39		
Villar, C.	27		
von Schwartzenberg, K.	26		
Voronkov, A.	42		
Vyroubalová, Š.	62, 95		
Wabnik, K.	105		
Wajeed, A.	98		
Wang, X.	64		
Wang, B.	69		
Ward, S.	85		
Waugh, R.	60		
Wegner, N.	26		
Weijers, D.	37		
Werbrouck, S.	111		
Werner, T.	25, 39, 57, 58, 71, 88, 99		
Werr, W.	49		
Wilhelmová, N.	94		
Wimalasekera, R.	27		
Xue, H.-W.	75		
Yakubov, B.	98		
Yalovsky, S.	72		
Yamaguchi, S.	85		
Yamburenko, M.V.	45, 86		

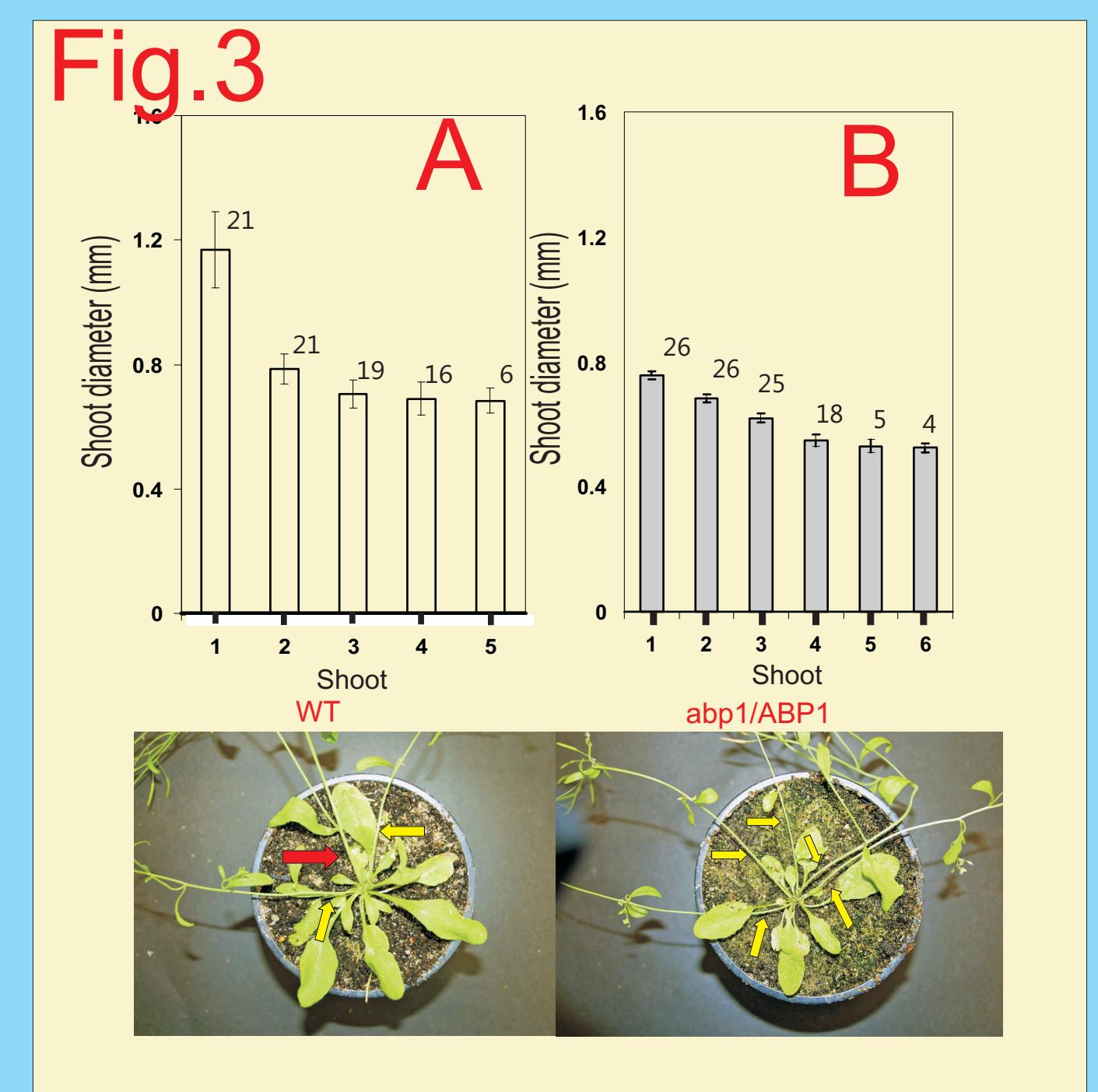
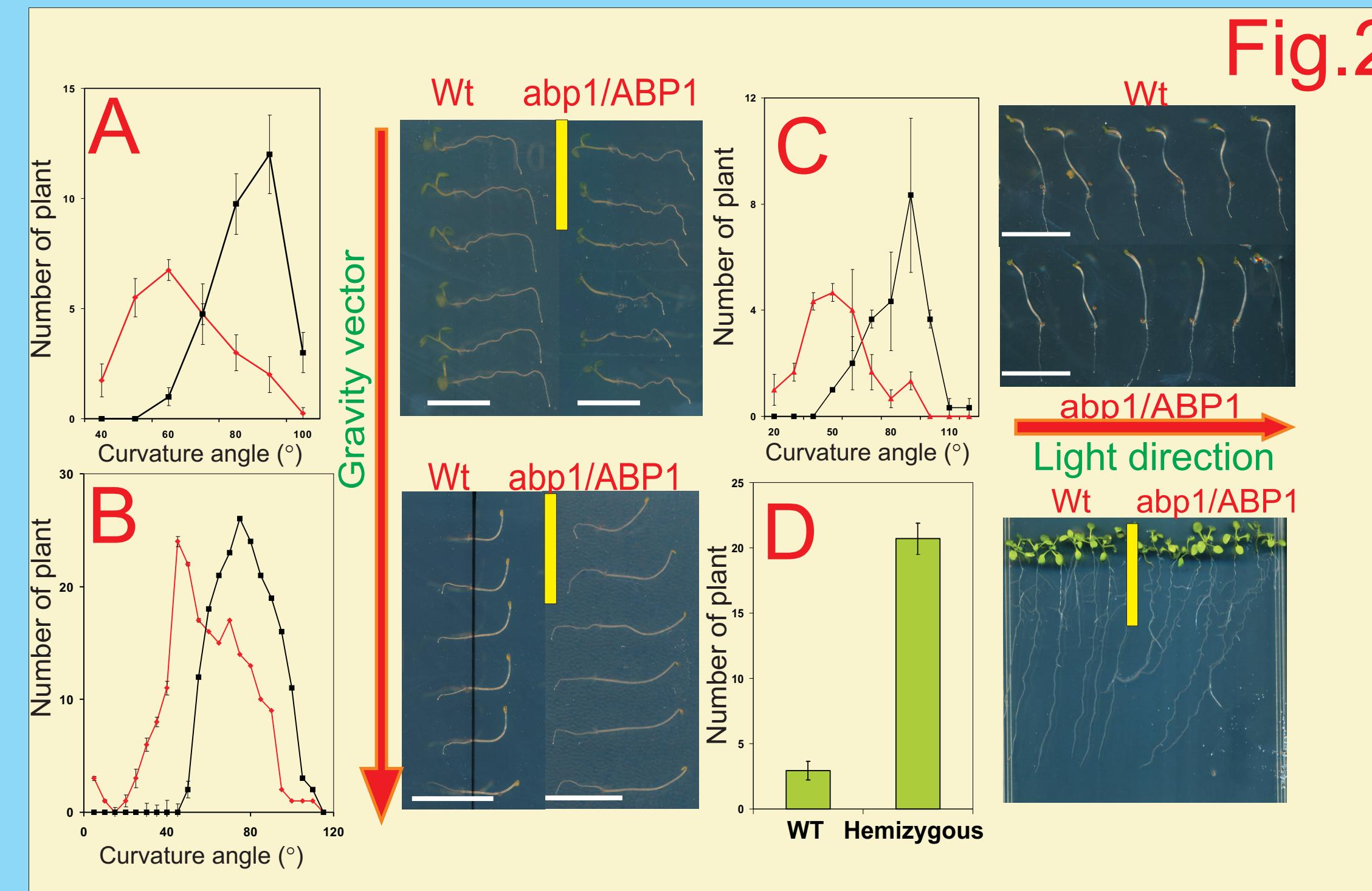
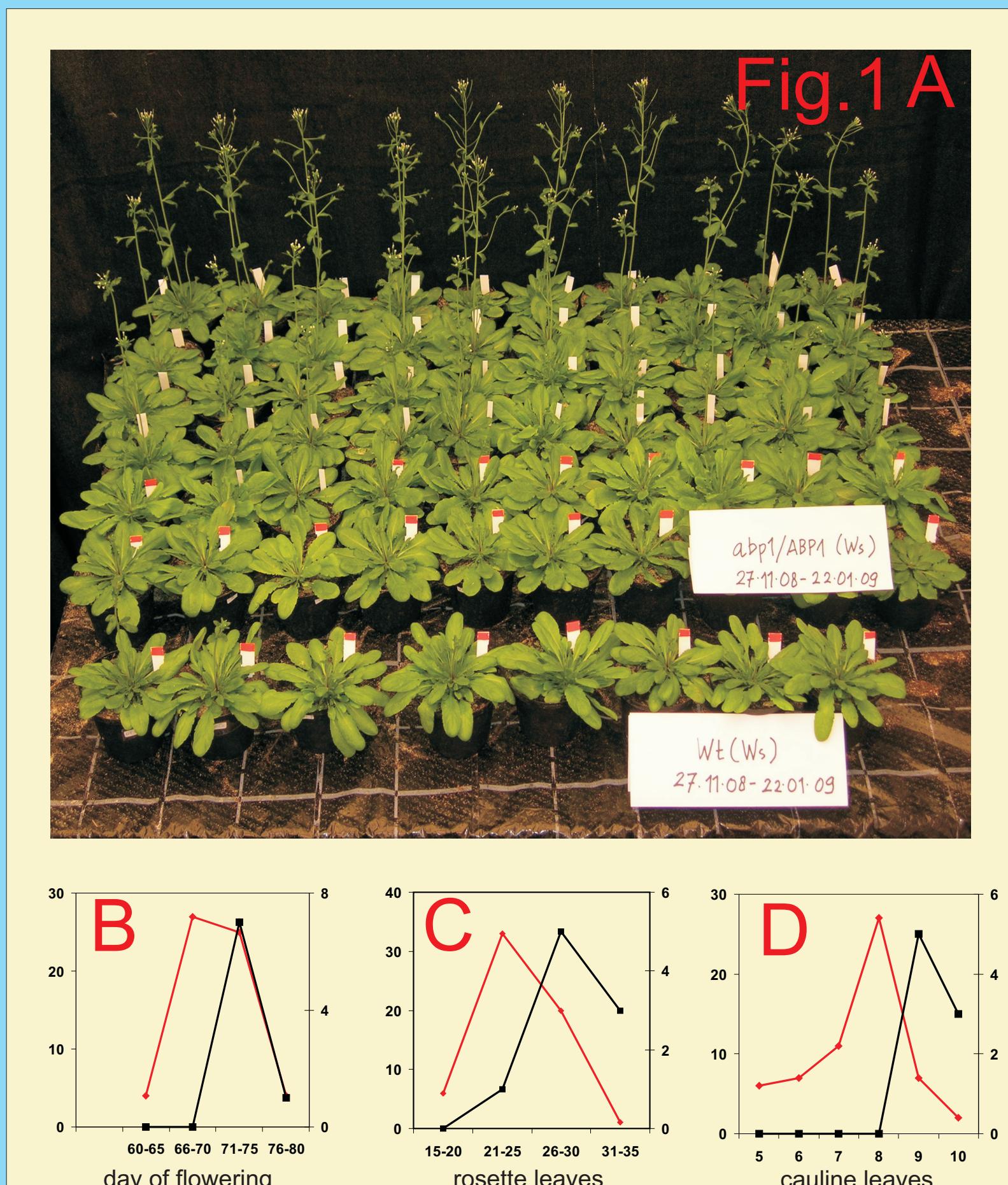
Auxin-Binding Protein 1 (ABP1), the second auxin receptor

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ABSTRACT

Despite knowing 3-dimensional structure ABP1 is not fully acknowledged as an auxin receptor. We used the insertional ABP1 mutant (Chen et al., 2001). It is lethal when homozygous but viable in the hemizygous *abp1/ABP1* state. A hemizygous plant produces 2:1=resistant:wildtype progeny on kanamycin agar due to the T-DNA and this lethality. Seedlings form *abp1/ABP1* plants are defect in phototropism and gravitropism of shoots and roots. Those populations are composed of a major slow reacting and a minor normal reacting group. *ABP1/abp1* seedlings show strong root slanting, longer hypocotyls, and slightly increased lateral root numbers. Root auxin responses (lateral root, main root length) in *abp1/ABP1* seedlings are slightly less sensitive than in wt. In short days and long days *abp1/ABP1* plants flower earlier. They have more branches and decreased main stem diameter, indicating decreased apical dominance. Auxin-induced genes (qPCR: *IAA2*, *IAA11*, *IAA13*, *IAA14*, *IAA19*, *IAA20*, *GH3.5*, *SAUR9*, *SAUR15*, *SAUR23*) respond to auxin (0.1μM/1μM) 2-15 fold stronger in WT than in *abp1/ABP1* seedlings (30 and 60 min). Thus, ABP1 is a receptor with probable functions in auxin transport and gene regulation. The apparent functional link to TIR1-link gene regulation could be provided by phospholipase A (Scherer et al., 2007, FEBS Lett. 581:4205-4211).



Expression of early auxin-induced genes in hemizygous *abp1/ABP1* and Wt in response to auxin application shows that they are less auxin-sensitive and reveals a link to TIR1

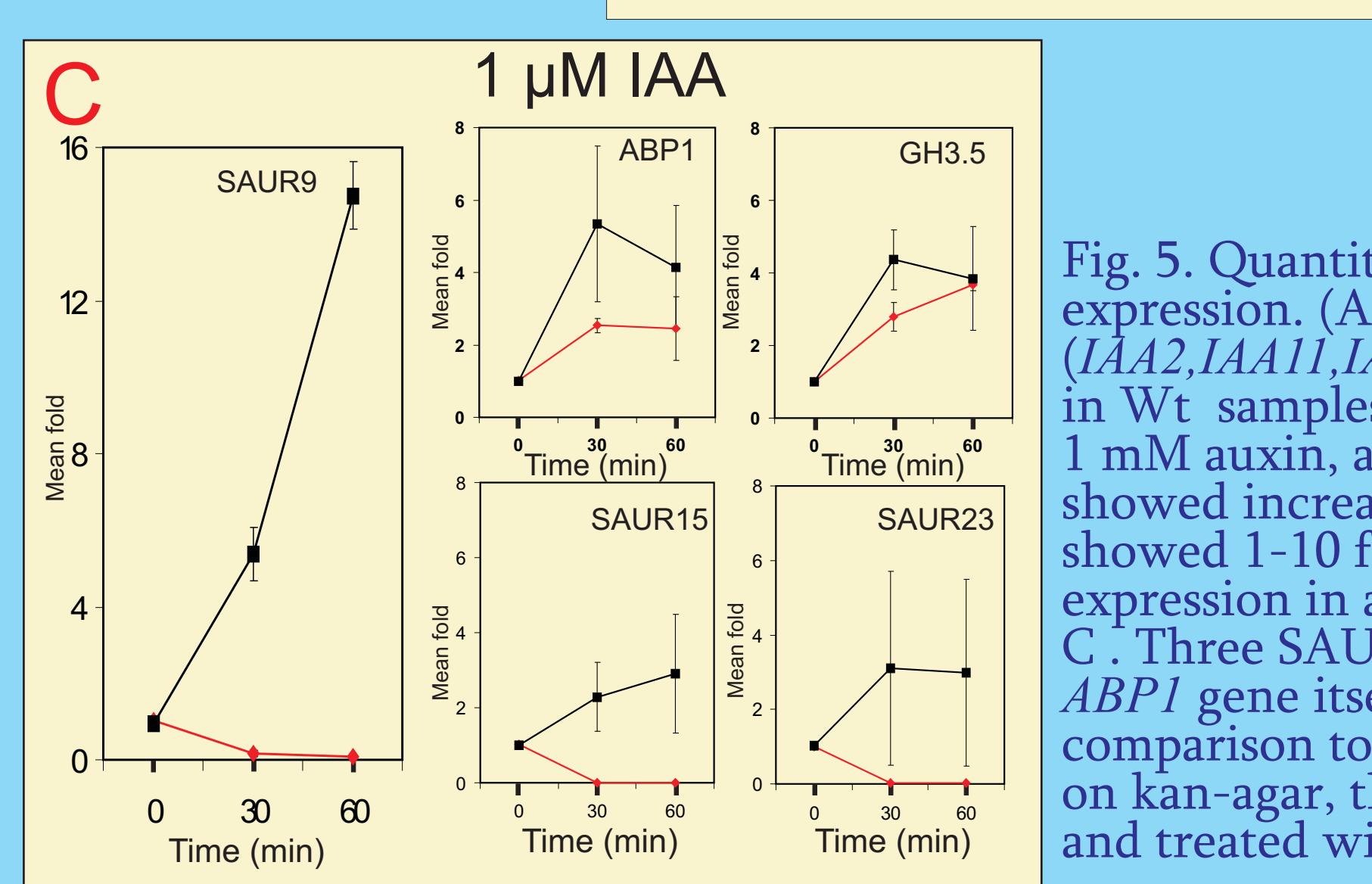
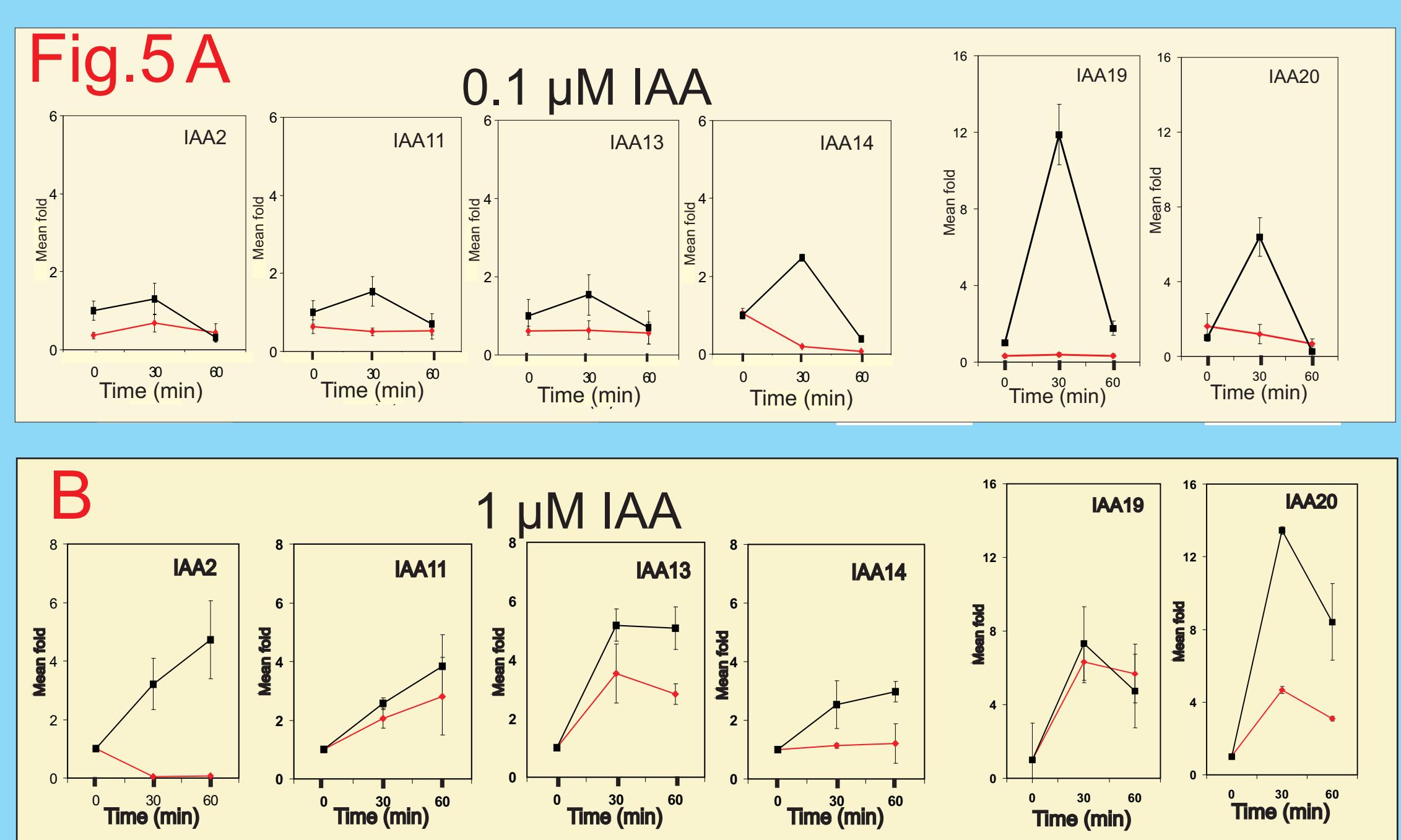


Fig. 5. Quantitative Real Time PCR data of early auxin-induced gene expression. (A) After 30 min 0.1mM auxin treatment, six IAA genes (*IAA2*, *IAA11*, *IAA13*, *IAA14*, *IAA19*, *IAA20*) showed increased expression in Wt samples but not in hemizygous *abp1/ABP1* samples. (B) With 1 mM auxin, after 30 min hemizygous *abp1/ABP1* and Wt samples showed increasing in gene expression in all IAA genes but Wt samples showed 1-10 fold more than hemizygous samples. (C) Increasing expression in another set of early auxin-induced genes is shown in fig. C. Three SAUR genes (*SAUR9*, *SAUR15*, *SAUR23*), *GH3.5* and the *ABP1* gene itself showed also 2-16 fold change different in Wt in comparison to hemizygous *abp1/ABP1* samples. Plants were selected on kan-agar, then grown for 5 d in liquid medium without kanamycin and treated with IAA.

Phenotypes of transformed *abp1_{mut}* mutants containing mutated cDNAs (In the process of selection for eventually double homozygous *abp1/abp1:abp1_{mut}/abp1_{mut}* genetic constitution)

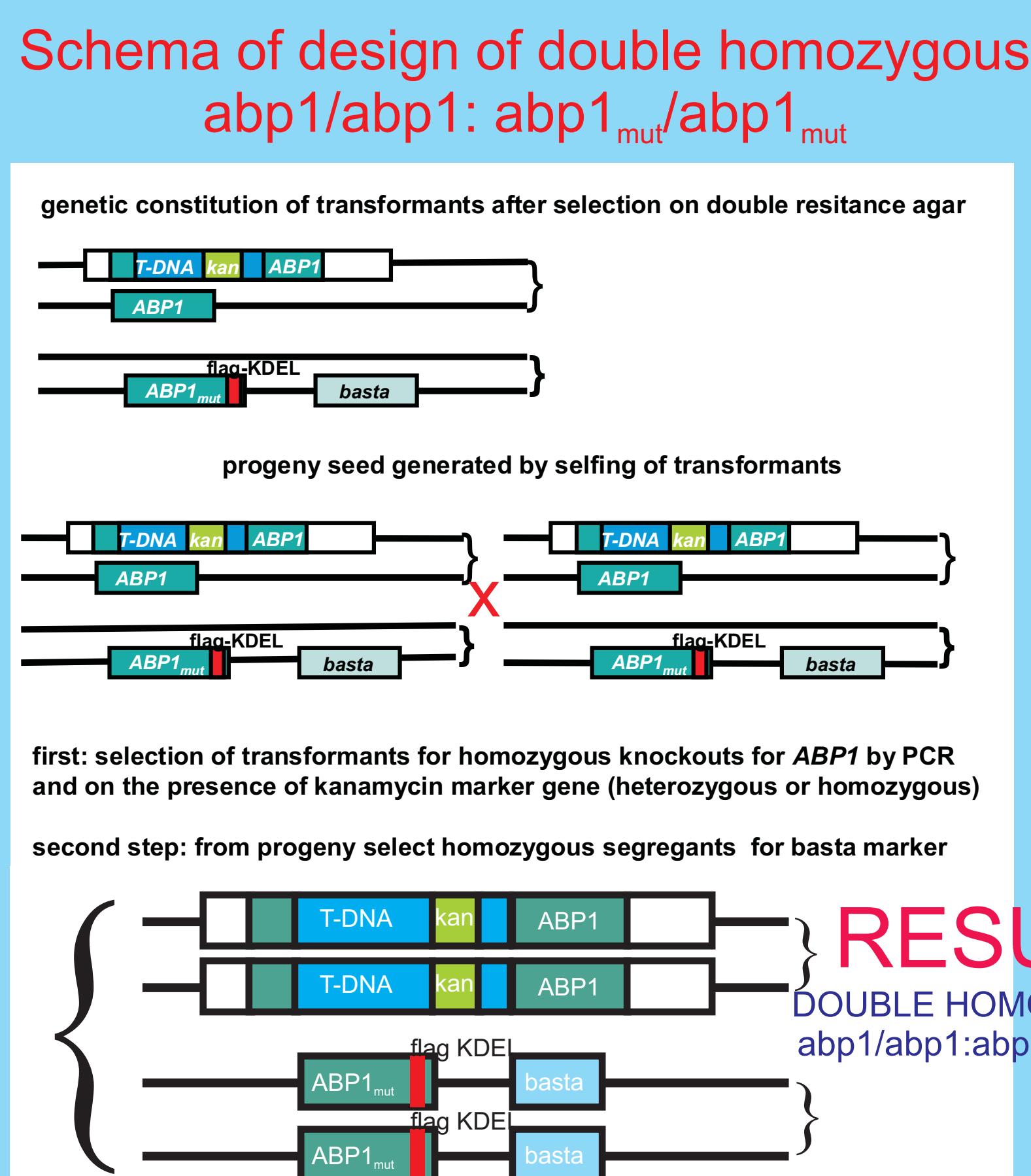


Fig. 6. Features of 80 day old mutant plants growth in LD. General appearance of mutants and Wt plants are shown on fig. A. Fig. B shows detail pictures of six plants of each mutants. Yellow arrows show curly leaves which are reminiscent of *phot1phot2* mutant (see phototropic deficiency above). Six different mutants were investigated and all mutants show fewer rosette leaf numbers in comparison to Wt ($p < 0.05$) (C), indicating early flowering. They also had reduced shoot numbers, especially in mutant 6 and 7 ($p < 0.05$) (D), indicating lower apical dominance.

Conclusion: ABP1 is a powerful receptor which regulates genes, likely with a functional link to TIR1. The hemizygous *abp1/ABP1* mutant is defect in responses requiring polar auxin transport. Early flowering in SD and LD is another property. Our in vitro mutant plants seem to have similar phenotypes.

