Control of early plant development by light quality

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List of abbreviations

Abbreviation	Description
a	y-intercept
ABA	Abscisic acid
ABCB19	ATP-BINDING CASSETTE B19
ABCG14	ATP-BINDING CASSETTE G14
AFB	AUXIN-BINDING F-BOX PROTEINS
AGL24	AGAMOUS-LIKE 24
AHL15	AT-HOOK MOTIF CONTAINING NUCLEAR LOCALIZED 15
AHP6	ARABIDOPSIS HISTIDINE PHOSPHOTRANSFER PROTEIN 6
AIL6	AINTEGUMENTA-LIKE 6
AM	axillary meristem
ANT	AINTEGUMENTA
AP	APETALA
Arabidopsis	*Arabidopsis thaliana*
ARF(s)	AUXIN REPSONSE FACTOR(s)
arg	arginine
ARR(s)	ARABIDOPSIS RESPONSE REGULATOR(s)
A.U.	arbitrary units
AUX1	AUXIN-RESISTANT 1
AUX/IAA(s)	AUXIN / INDOLE-3-ACETIC ACID PROTEIN(s)
b	regression coefficient (slope)
B	blue
BES1	BRI1-EMS-SUPPRESSOR 1
BGR	blue-grown roots
bHLH	basic helix-loop-helix
BIL1	BRASSINOSTEROID-INSENSITIVE 2-LIKE 1

BR	brassinosteroids
BZR1	BRASSINAZOLE-RESISTANT 1
CAL	CAULIFLOWER
CAPS	cleaved amplified polymorphic sequence
CCE	CRY C-terminal extension
CDF(s)	CYCLING DOF FACTOR(s)
CIB(s)	CRY2-INTERACTING bHLH(s)
CK	cytokinin
CKX2	CYTOKININ DEHYDROGENASE 2
CLV	CLAVATA
CO	CONSTANS
Col-0	Columbia
COP	CONSTITUTIVE PHOTOMORPHOGENIC
CPD	cyclobutane pyrimidine dimer
CRY(s)	cryptochrome(s)
CSN	COP9 signalosome
CTCF	corrected total cell fluorescence
CTF	corrected total fluorescence
CZ	central zone
DAG	days after germination
DAS	days after sowing
DET	DE-ETIOLATED
DGR	dark-grown roots
DN	day-neutral
DNA	deoxyribonucleic acid
Ehd1	Early heading date 1
EIN3	ETHYLENE-INSENSITIVE 3
ERF(s)	ETHYLENE RESPONSE FACTOR(s)

ET	ethylene
FAD	flavin adenine dinucleotide
FAR1	FAR-RED IMPAIRED RESPONSE 1
FHL	FHY1-like
FHY	FAR-RED ELONGATED HYPOCOTYL
FIL	FILAMENTOUS FLOWER
FKF1	FLAVIN-BINDING KELCH REPEAT 1
FLC	FLOWERING LOCUS C
FMN	flavin mononucleotide
FO	Foundation
FR	far-red
FT	FLOWERING LOCUS T
FUL	FRUITFULL
FUS	FUSCA
FW	forward
GA	gibberellic acid
GFP	green fluorescent protein
GI	GIGANTEA
HAM	HAIRY MERISTEM
HCA2	HIGH CAMBIAL ACTIVITY 2
Hd1	Heading date 1
Hd3a	Heading date 3a
HEC	HECATE
HFR1	LONG HYPOCOTYL IN FAR-RED 1
HIR	high irradiance response
HKRD	Histidine kinase-related domain
HSD	honestly significant different
HY4	ELONGATED HYPOCOTYL 4 (CRY1)

HY5	ELONGATED HYPOCOTYL 5
HYH	HY5 HOMOLOGUE
IAA	indole-3-acetic acid (auxin)
IM	inflorescence meristem
JA	jasmonic acid
KRP2	KIP-RELATED PROTEIN 2
LAF1	LONG AFTER FAR-RED LIGHT
LAX	LIKE-AUX1
LBD	LATERAL ORGAN BOUNDARIES DOMAIN
LD	long-day
LED(s)	light-emitting diode(s)
L*er*	Landsberg *erecta*
Lettuce	*Lactuca sativa*
LFR	low fluence response
LFY	LEAFY
LGR	light-grown roots
LKP2	LOV KELCH PROTEIN 2
LMP	low melting point
LOG	LONELY GUY
LOV	light, oxygen, or voltage
LSA	leaf surface area
L/W ratio	length / width ratio
miR	microRNA
MM	Moneymaker
MP	MONOPTEROS (ARF5)
NAA	1-naphthaleneacetic acid
NASC	Nottingham Arabidopsis Stock Centre
NBs	nuclear bodies

NFY(s)	NUCLEAR FACTOR Y(s)
NLS	nuclear localisation signal
nm	nanometre
NPA	1-naphthylphthalamic acid
NPH1	NON-PHOTOTROPIC HYPOCOTYL 1 (PHOT1)
NPH3	NON-PHOTOTROPIC HYPOCOTYL 3
NPL1	NPH1-like 1 (PHOT2)
n.s.	not significant
NOW	Dutch Research Council (Nederlandse organisatie voor Wetenschappelijk Onderzoek)
OC	organizing centre
PAR	photosynthetically active radiation
PAT	polar auxin transport
PBS	phosphate-buffered saline
PCR-RFLP	PCR- restriction fragment length polymorphism
PFA	paraformaldehyde
Pfr	FR-absorbing form of phytochromes
PHOT(s)	phototropin(s)
PHR	photolyase homologous region
PHY(s)	phytochrome(s)
PI	propidium iodide
PIF(s)	PHYTOCHROME INTERACTING FACTOR(s)
PIN	PIN-FORMED
PKS	PHYTOCHROME KINASE SUBSTRATE
PLT3	PLETHORA 3
PP2A	PROTEIN PHOSPHATASE 2A
PPF	photosynthetic photon flux
Pr	R-absorbing form of phytochromes

Prim	primary
PRR(s)	PSEUDO-RESPONSE REGULATOR(s)
PXY	PHLOEM INTERCALATED WITH XYLEM
PZ	peripheral zone
PΦB	phytochromobilin tetrapyrrole chromophore
QC	quiescent centre
r	correlation coefficient
R	red
RAM	root apical meristem
R/B	red/blue ratio
R:FR	red/far-red ratio
RGR	red-grown roots
ROS	reactive oxygen species
RSA	rosette surface area
RTP2	ROOT PHOTOTROPISM 2
RUP	REPRESSOR OF UV-B PHOTOMORPHOGENESIS
RV	reversed
RZ	rib zone
SAM	shoot apical meristem
SCF	Skp, Cullin, and F-box
SD	short-day
SE	standard error
Sec	secondary
SEP3	SEPALLATA 3
ser	serine
SOC1	SUPPRESSOR OF CONSTANS 1
SPA1	SUPPRESSOR OF PHYA 1

SPL(s)	SQUAMOSA PROMOTER BINDING PROTEIN-LIKE(s)
STM	SHOOT MERISTEMLESS
TAA1	TRYPTOPHAN AMINOTRANSFERASE OF ARABIDOPSIS 1
TAR	TRYPTOPHAN AMINOTRANSFERASE RELATED
TCP	TEOSINTE BRANCHED 1, CYCLOIDEA, PROLIFERATING CELL FACTOR
TDIF	TRACHEARY ELEMENT DIFFERENTIATION
Tert	tertiary
TFL1	TERMINAL FLOWER 1
TGRC	Tomato Genetics Resource Centre
thr	threonine
THz	terahertz
TIP41	TAP42-interacting protein
TIR1	TRANSPORT INHIBITOR RESPONSE 1
TMO6	TARGET OF MONOPTEROS 6
TOC1	TIMING OF CAB EXPRESSION 1
TOE	TARGET OF EARLY ACTIVATION TAGGED
ToFZHY	tomato YUCCA orthologue
tomato	*Solanum lycopersicum*
TOR	TARGET OF RAPAMYCIN
trp	tryptophan
UV	ultra-violet
UV-B	ultra-violet B
UVR8	UV RESISTANCE LOCUS 8
VIN3	VERNALIZATION INSENSITIVE 3
VLFR	very low fluence response

VND	VASCULAR-RELATED NAC-DOMAIN
VPC	vegetative phase change
VRN	VERNALIZATION
W	white
WAS	weeks after sowing
WOX	WUSCHEL-RELATED HOMEOBOX
WUS	WUSCHEL
YFP	yellow fluorescent protein
YUC	YUCCA
ZT	Zeitgeber time
ZTL(s)	ZEITLUPE(s)

Curriculum vitae

Kiki Spaninks was born on November 25th, 1990, in Voorburg, the Netherlands. After graduating from ‘t Stedelijk College in Zoetermeer, she started her Biology study at Leiden University in 2008. She obtained her BSc degree with a minor in modern drug discovery (chemistry) in 2011. Her BSc programme included an internship at the Molecular Cell Biology department of the Institute of Biology Leiden (IBL) under the supervision of Prof. dr. A.H. Meijer and PhD student M. van der Vaart, where she studied the role of nitric oxide during the innate immune response of MyD88-deficient zebrafish against *Mycobacterium marinum*. In 2011, she continued with the Master study Biology at Leiden University, with a specialisation in Molecular and Cellular Biosciences that included two internships. During the first internship at the Molecular Genetics department of the IBL, she applied multi-colour BiFC to visualise the translocation of *Agrobacterium tumefaciens* virulence proteins to *Saccharomyces cerevisiae* (yeast) under the supervision of dr. G.P.H. van Heusden and PhD student P.A. Sakalis. In the second internship with dr. H.J.M. Linthorst and PhD student Y. Zhou at the Plant Cell Physiology department of the IBL, she investigated the putative function of EDS5 as a salicylic acid transporter using yeast as a model organism. After receiving her MSc degree in 2013, she spent six months studying proteolysis in human tissue macrophages at the Erasmus Medical Centre in Rotterdam under the supervision of Prof. dr. J.J.M. van Dongen. In 2015, Kiki started as a PhD student in the Plant Developmental Genetics group of Prof. dr. R. Offringa at the IBL, as part of the NWO/STW funded LED it be 50% consortium. Here she studied the effects of light quality on the early plant development of *Arabidopsis thaliana* and *Solanum lycopersicum*, of which the results are described in this thesis. In 2020, she continued to work in the Offringa group

as post-doctoral researcher to study tipburn as part of the NWO/TTW funded LettuceKnow consortium. From October 2022 on she works as Assistant Professor at the IBL focusing on teaching and researching shoot-root signalling *in planta*.