SHABTAI COHEN June 2019

Part I: CURRICULUM VITAE

I. Personal

1952 Born in Queens County, New York

1966-1970 High School in Yeshiva University High School, New York, N.Y.

1982 Military service, IDF

Marital status: married + 4

II. University Education and Additional Training

1970-1974 B.A. in Biology at Queens College of CUNY, N.Y.

1974-1977 M.Sc. in Botany at the Hebrew University of Jerusalem.
Title of thesis: Potential Transpiration in the Summer and Aspects of the Physiological Ecology of the Genus Phlomis on Mount Hermon.
Supervision by: Professor Joseph Gale

1978-1983 Ph.D. in Agriculture at the Hebrew University of Jerusalem.
Title of thesis: Light Relations of an Orange Canopy.
Supervision by: Professor Marcel Fuchs

2001-2002 Sabbatical leave at Northeastern Research Station, USDA Forest Service, Burlington VT, USA with Prof. Melvin Tyree.
Research subject: Influence of hydraulic properties of rootstocks and the rootstock-scion graft on water use and productivity of apple trees

2009-2010 Sabbatical leave at the Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, Ma, USA with Prof. N. M. Holbrook.
Research subject: Spatial distribution of sap flux density in tree stems: measurement, explanation and modeling.

III. Positions held and Academic Status

1983-1984: Research Scientist at the ARO, Inst. of Soils and Water, Dept of Environmental Physiology and Irrigation.

1984-1985: Senior Software Engineer, ABC Electronics, Ashdod.

1985-1989: Software Team Leader, ABC Electronics, Ashdod

1989-1993: Software Integrator and Tester, ABC Electronics, Ashdod.

1993-1998: Research Scientist (Grade C) at the ARO, Inst. of Soils and Water, Dept of Environmental Physics and Irrigation.

1998-2004: Senior (Grade B) Research Scientist at the ARO, Inst. of Soil, Water and Environmental Sciences, Dept of Environmental Physics and Irrigation.

2001-2002: Research Scientist (Plant Physiologist), USDA Forest Service, Northeastern Forest Research Station, Aiken Forestry Sciences Laboratory, Burlington, VT, USA. An affiliate of the University of Vermont (on Sabbatical leave from the Volcani Center).

2004-2010: Senior (Grade A) Research Scientist at the ARO, Inst. of Soil, Water and Environmental Sciences, Dept of Environmental Physics and Irrigation.

2010-present: Senior (Grade A+) Research Scientist at the ARO, Inst. of Soil, Water and Environmental Sciences, Dept of Environmental Physics and Irrigation.

2011-2014: Department head, Dept of Environmental Physics and Irrigation.

2015-2017: Scientific Director, Inst. Soil, Water and Environmental Sciences.

IV. Training / Teaching Experience (including guidance of students and foreign scholars)

2003-2004 Lecturer at the Hebrew University Faculty of Agriculture, fall semester, course entitled: The Principles of growing in protected climates (Greenhouse agriculture, course no. 71432). Course included 2 hours lecture, 1.5 h laboratory, and 1 h exercise per week.

2007-2011 Lecturer at the Hebrew University Faculty of Agriculture, spring semester, course entitled: Fundamentals of Agricultural Meteorology (course no. 71619). Course included 2 hours lecture, and 1 h exercise per week; taught together with Dr. J. Tanny.

2007 Lecturer at the FAO/IAEA Agriculture and Biotechnology laboratory, Seibersdorf, Vienna, Austria. Interregional training course; on “Use of nuclear and related techniques to measure storage, flows and balance of water in cropping systems”, 1-25 October, 2007. (28 hours).

2008-2011 Lecturer at the Hebrew University Faculty of Agriculture, fall semester, course entitled: Agrometeorology (course no. 71610). Course included 2 hours lecture, and 1 h lab per week; taught together with Dr. J. Tanny.

2011-2012 Lecturer at the Hebrew University Faculty of Agriculture, fall semester, course entitled: The Principles of growing in protected climates (Greenhouse agriculture, course no. 71432). Course included 2 hours lecture, 1.5 h laboratory, and 1 h exercise per week.

2012-2014 Lecturer at the Hebrew University Faculty of Agriculture, fall semester, course entitled: Agricultural Micro-meteorology (course no. 71103). Course included 2 hours lecture, and 2 h lab per week; taught together with Dr. J. Tanny.

2015-present Lecturer at the Hebrew University Faculty of Agriculture, fall semester, course entitled: Agricultural Micro-meteorology (course no. 71103). Course includes 2 hours lecture, and 2 h lab per week.

Student guidance:

1995 **Loic LeGuillou,** MSc., Thesis: Response of citrus to a decrease in solar radiation in a sub-tropical region (study of the water relationships in plants and the estimation of transpiration). ISTOM, Cergy-Pontoise Cedex, France. Co-Supervisor; guidance with Dr. S. Moreshet, ARO.

1998 **David Meerbach**, MSc. Thesis: Quantifying the effects of two layouts of drip irrigation with treated sewage effluent on water and salt distribution in the soil profile and on cotton transpiration. Wageningen Agricultural University. Co-Supervisor; guidance with Dr. Chris Dirksen, Wageningen.

2002 **Markus Moller,** MSc. Thesis: The effects of insect-proof nets on exchange of mass and momentum in a screenhouse for pepper cultivation in central

Israel, Dresden University of Technology. Co-Supervisor; guidance with Dr. Y. Tanny, ARO and Dr. C. Bernhofer, Germany.

2008 **Gal Ziv**. MSc. Thesis: Polyethylene mulch as a tool for managing "wetness promoted" foliar diseases of greenhouse vegetables. Heb.Univ. Faculty of Agriculture. Co-supervisor; guidance with Prof. Dani Steinberg, Plant Protection Inst.

2008 **Michael Atias**. MSc. Thesis: Measurement and prediction of average photosynthesis and transpiration in greenhouse subjected to forced ventilation. Heb.Univ. Faculty of Agriculture. Co-supervisor; guidance with Dr. Meir Teitel, Agricultural Engineering Inst.

2009 **Michael Sprintsin**, PhD. Thesis: Evaluation of spatial and temporal variations of thermal-water stress of a dry land forest from satellite images. Ben Gurion University, Dept. of Geography. Co-Supervisor; guidance with Prof. Arnon Karnieli and Prof. Pedro Berliner, BGU.

2009 **Yishai Wachsmann.** MSc., Thesis: The effect of color nets on the physiology, yield and water use in the citrus easy peeler variety "Or 1". Heb. Univ. Faculty of Agriculture. Co-supervisor; guidance with Dr. Avi Zadka and Dr. Yosepha Shahak, Inst. of Field Crops.

2010 **Tal Kanety** - MSc., Thesis: Yield and physiological and environmental indicators of stress in Persimmon trees irrigated at different levels with effluents. Heb. Univ. Faculty of Agriculture. Co-supervisor; guidance with Dr. Amnon Schwartz, Heb. U. Faculty of Agriculture.

2012 **Tamir Klein** – PhD., Thesis: Ecophysiology of water use in Pinus halepensis – from leaf to forest scale. Weizmann Inst. of Science. Co-supervisor; guidance with Prof. Dan Yakir.

2013 **Indira Paudel** – MSc. Thesis. Sap flow response to irrigation treatments and climate in nectarine trees. Heb. U. Faculty of Agriculture. Guidance with Prof. Amnon Schwartz.

2014 **Diriba Nemera Bane** – MSc. Thesis: The influence of shade screens on water relations and fertility of a citrus orchard. International program.

Heb. U. Faculty of Agriculture. Guidance with Dr. Avi Sadka (Volcani Center).

2014 **Eyal Nevo** – MSc. Thesis. Deficit irrigation of nectarine during the stone hardening stage with the assistance of tensiometers, soil volumetric water content sensors and dendrometers. Heb. U. Faculty of Agriculture. Guidance with Prof. Roni Wallach.

2017 **Indira Paudel** – PhD. Thesis. Irrigation water quality effects on root and shoot development of grapefruit plants. Heb. U. Faculty of Agriculture. Guidance with Prof. Amnon Schwartz and Prof. Y. Ephrath (Ben Gurion U.)

In progress **Ori Ahiman** – PhD. Thesis. Prediction of midday stem water potential to eliminate the required use of the pressure chamber for irrigation scheduling. Heb. U. Faculty of Agriculture.

In progress **Ela Zangy** – PhD. Thesis. Relationships between forest canopy cover and understory vegetation. Heb. U. Faculty of Agriculture. Guidance with Yagil Osem and Prof. Jaime Kigel.

2018 **Nitai Haiman**. M.Sc. Estimation of Evapotranspiration of crops in small plots using the “surface renewal” method. Guidance with Dr. Josef Tanny.

In progress **Daniel Hadad**. M. Sc. Developing irrigation protocols and determining water use of crops in screenhouses and greenhouses.. Guidance with Dr. Josef Tanny.

In progress **Diriba Nemera Bane**. PhD. Evaluating Management Practices to Prevent and Mitigate Damage to an Avocado Orchard Irrigated with Treated Wastewater (TWW) in a Clay Soil. Guidance with Drs. Asher Bar Tal and Guy Levy.

In progress **Zohar Deutsch.** PhD. Evaluating Management Practices to Mitigate Damage to an Almond Orchard Irrigated with Treated Wastewater (TWW) in a Clay Soil. Guidance with Dr. Asher Bar Tal

In progress **Asaf Alon**. PhD. Identifying woody species at risk due to climate change in Israel. Guidance with Rakefet David-Schwartz.

V. Membership in Scientific and Agricultural Committees:

A. Local

1999 Ministry of the Environment. Representative of the Ministry of Agriculture on the inter-ministry committee to recommend policy for ratifying the Kyoto protocol

2000-2003 ARO proposal evaluation committee for “Technologies and greenhouses”

2000-2001 BARD proposal evaluation committee for “Soils and Water”

2004-2005 ARO proposal evaluation committee for “Water Use Efficiency”

2010-2013 BARD proposal evaluation committee for “Soils and Water”

2011-2012 Ad-hoc committee for changing evapotranspiration reports from Class-A Pan to the Penman-Monteith model. Committee led by Shaham and includes Israel Met Service and Ministry of Agriculture members

2012-2017 Chief Scientist proposal evaluation committees – (1) Soils and Water, and (2) Technologies (to 2013; 2016-on)

2017-present Chief Scientist proposal evaluation committee –Technologies

2017-present BARD research proposal evaluation committee for “Soils and Water”

International:

2007-2010 COST FORMAN (FP0601) action (EU): Forest Management and the Water Cycle. Israeli delegate, member of management and steering committees, and scientific secretary of the action.

2013-2016 COST STREESS (FP1106) action (EU): Studying tree responses to extreme events: a synthesis. Israeli delegate, member of management committee.

VI. Editorial Responsibilities:

1995 to date Reviewer of manuscripts for a range of journals:

VII. Participation in International Meetings, Seminars, Courses, Tours and Similar Functions:

1979 The 8th International Congress of Biometeorology, Shefayim, Israel. **(paper)**

1995 The Jehuda Neumann Memorial Symposium on Mesoscale Modelling and Climate History (co-sponsored by the American Meteorological Society). **(paper)**

1995 (**Invited lecture series)** University of Horticulture and Food Industry, Budapest. by the Pro Renova Cultura Hungariae Foundation.

1995 (**Invited lecture and instructor)** British Ecological Society and Society for Experimental Botany workshop on Instrumentation for Ecophysiological Research, Rapolano Terme, Italy.

1997 The first regional conference on Interdisciplinary Strategies for Development of Desert Agriculture. Sde Boker. **(paper)**

1997 Lakes of the Jordan Valley: an international workshop sponsored by IAEA, Weitzman Inst., Sedom. **(paper)**

1997 Second International ISHS Symposium on Models for Plant Growth, Environmental Control and Farm Management in Protected Cultivation, Wageningen, The Netherlands. **(Paper)**

1998 (**Invited lecture and instructor),** British Ecological Society and Society for Experimental Botany 4th international workshop on Field Techniques for Environmental Physiology. Almeria, Spain. **by BEC/SEB.**

1998 First International ISHS Citrus Biotechnology Symposium, Eilat, Israel **(poster)**.

1999 Third International ISHS workshop on Models for plant growth and control of the shoot and root environments in greenhouses. (**paper)**

2000 International Society of Citriculture 2000 conference (ISC2000). Orlando, Fla. **(paper)**

2001 **(Invited lecture)** University of Vermont. Part of the “Global Climate Change” seminar series.

2002 **(Invited lecture)** Israeli-Dutch Workshop on Greenhouse Technology and Management. **by the Chief Scientist of the Israeli Ministry of Agriculture.**

2003 Fourth International Symposium on Irrigation of Horticultural Crops. Univ. of Calif., Davis. (**paper)**. (**Chaired the**

session on “Evapotranspiration, Crop Coefficients and Modeling”.)

2004 American and Canadian Geophysical Unions (AGU/CGU) joint assembly – Montreal; May 17-21 2004. **Convener and chairman of the session** on: Magnitude and causes of decreasing surface solar radiation. Paticipated in press conference. Covered in major newspapers including NY Times and Nature Science update. (**two papers).**

2005 Israel Society for Ecology and Environmental Quality Sciences. 2005 International Conference “Living with Global Change: Challenges in Environmental Sciences. Weizmann Inst. Of Science. Rehovot. (**poster)**

2006 (**Invited lecture)** Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland. **Honorarium.**

2006 (**Invited lecture)** Institute for Atmospheric and Climate Science ETH, Swiss Federal Institute of Technology, Zurich, Switzerland. **Honorarium.**

2006 European Geophysical Union (EGU) General Assembly 2006. Vienna, Austria, April 3-7, 2006. **(1 paper; 2 posters)**.

2006 (**Invited lecture)** International workshop on isotopic effects in evaporation. Revisiting the Craig-Gordon Model four decades after its formulation, Area della Ricerca CNR, Pisa, Italy. **Partial.**

2005 Third Polish-Israeli Conference on Irrigation. Bet Dagan, Israel. **Organizer of scientific program**. **(paper)**

2006 Third International Symposium on Models for Plant Growth, Environmental Control and Farm Management in Protected Cultivation (Hortimodel 2006). Wageningen, The Netherlands. **(2 posters). Chaired session** on “Climate management”.

2007 **(Invited lecture)** Expert Meeting on “Climate change impacts on European agriculture”, 8-9 March, 2007. JRC-Ispra Italy (IPSC – Institute for the Protection and Security of the Citizen), AGRIFISH MARS unit. **by JRC.**

2007 COST FORMAN (Forest Management and the Water Cycle) Plenary meeting, Gottingen, Germany **(paper)..**

2008 International Workshop of the Israel Science Foundation on Global Dimming and Brightening. Ein Gedi, Israel. **Chaired organizing committee. Delivered opening address. (paper + 2 posters)**.

2009 The Dahlia Greidinger International Symposium – 2009: Crop Production in the 21st Century: Global Climate Change, Environmental Risks and Water Scarcity. Technion, Israel. **(Organizing committee member, session chairman, paper + poster)..**

2009 COST Dynamic training school entitled: Forest and Water Stress in a Changing Environment: from Cell to Ecosystems. **Co-sponsored by:** COST FP 0601, FORMAN - Forest Management and the Water Cycle and COST FA 0603, PPE - Plant Proteomics in Europe; Orvietto, Italy. **(Lecturer and student session organizer)**.

2009 COST FORMAN workshop/conference in Sde Boqer Nov 9-12, 2009 entitled “Water Issues in Dryland Forestry”. **Co-sponsored by:** COST FP 0601, FORMAN - Forest Management and the Water Cycle, Ben Gurion University, Weizmann Inst. Sussman Center for Environmental Studies, KKL, Coal Ash Board, and ARO. **(Head of organizing committee and Session chairman)..**

2010 ISHS VII International Symposium on Sap Flow. 8-12 May 2011, Volterra, Italy. **Invited Speaker and Scientific committee member.. (paper).**

2011 The International CIPA Conference 2012: Plasticulture for a Green Planet. (in Agritech). May 15-17, Tel Aviv, Israel. **Invited Speaker. (paper).**

2012 International course “Agriculture and Environment in a changing climate”. **Scientific organizer**. Nov 27-Dec 18, 2012. Joint program of Cinadco, Mashav and the Inst. Of Soil, Water and Env. Sci.

2012 Hortimodel:symposium on models for plant growth, environmental control and farm management in protected cultivation. November 2012, Beijing. Scientific committee

2013 Visit to Japan, Feb 2013. **Funded by University of Okayama (all expenses, inclusive).**

Activities: Feb 5: University of Okayama: Seminar on water transport characteristics in tree species. **Invited lecture.**

Feb 6: University of Okayama: Workshop for detailed tree physiology. **Invited lectures and workshop.**

Feb 12: Tsukuba. Agro-Meteorology Division, National Institute for Agro-Environmental Sciences. **Invited lecture.**

2013 **(Invited keynote speaker)**. European Research Consortium MACSUR workshop hosted by The Natural Resource and Environmental Research Center (NRERC), the University of Haifa. March 3-5.

2013 Sap flow workshop. June 2013 Gent, Belgium, **Scientific committee**. Lecturer.

2013 Evenari symposium. Automated Methods for Continuous Measurements in Agriculture and Forestry. Sept 2013. Sde Boqer, **Scientific committee and invited speaker.**

2015 **(invited speaker).** Water-Food-Energy-Ecosystems security nexus, CNR, Milano

2016 (invited speaker). USDA Drought Management Conference: “Water Management Strategies for Perennial Crops with Limited and Impaired Water Supplies”. Modesto, Ca. USA

2016 **(invited speaker).** Palm Beach International Agricultural Summit. Florida USA

2017 Sap flow workshop. May 2017. Fullerton, Ca. Scientific committee

2017 Desert, Desertification and Drought conference. Nov. 2017. Sde Boqer. **Invited speaker**

2017 International course “Agriculture and Environment in a changing climate”. **Scientific organizer**. Nov 26-Dec 13, 2017. Joint program of Cinadco, Mashav and the Inst. Of Soil, Water and Env. Sci.

2018 International workshop “Physiological and Molecular Adaptation to Climate Change in Forest Trees”. **Scientific organizing committee and Invited Speaker**. Feb 26-March 1, 2018. Joint workshop with ARO Volcani Center, Weizmann Inst. And European EVOLTREE program.

2018 Multiscale Plant Vascular Biology Gordon Research Conference. June 17, 2018 - June 22, 2018. VT USA. **Invited speaker**

2018 BARD and UC Davis conference on The Future of Water for Irrigation in California and Israel. July 16-18, 2018. Davis, CA. **Organizer and BARD grant recipient.**

2019 XI International symposium on protected cultivation in mild winter climates and first international symposium on netting and screens in Horticulture. **Scientific committee and Speaker**. Jan 27-31, 2019. ISHS, Tenerife, Spain.

VIII. Invitation by Professional Societies in Israel

1984 **(invited lecture)** Annual Meeting of the Israeli Meteorological Society

2005 **(invited lecture)** 15th Evenari Memorial Conference – "Forests and Environment in Drylands". Jacob Blaustein Institute for Desert Research, Sde Boqer.

2006 Annual conference of the Israel Society for Soil Science and conference on irrigation with sewage effluents. **Chaired session**

2006 **(invited lecture)** AgroMashov 2006 Tel Aviv Fairgrounds, conference entitled "Production under Protected Conditions in Mediterranean Climate

2006 **(invited lecture)** Agritech 06, Tel Aviv Fairgrounds, conference entitled "Agriculture under limited water conditions".

2007 **(invited lecture)** Plasto-Ispack 07, Tel Aviv Fairgrounds, conference entitled "Plastics in Agriculture".

2007 Irrigation conference at the Institute of Soil, Water and Environmental Sciences **(paper)**. **Chaired session** on drip irrigation.

2009 **(invited lecture)** Ministry of Environmental Protection, Jerusalem. Conference entitled "Climate change in Israel 2009 – an assessment".

2018 **(invited lecture)** Weizmann Inst. Of Science, Rehovot. New Insights in Tree Hydraulics – international workshop. Jan 22-25, 2018.

IX. Membership in Professional Societies

Soil Science Society of Israel – member of board of directors and secretary, 2003-2007

Israel Botanical Society

The Society for Experimental Biology (British)

Israel Meteorological Society

American Geophysical Union (AGU)

European Geophysical Union (EGU)

International Society for Horticultural Sciences (ISHS)

XI. Research Grants

(A) International Competitive Grants

1993 DIARP grant. Title: "Modelling for optimization of the greenhouse environment, with special reference to crop performance and resource use". Cooperating Investigator, for 3 years. Budget: Total: 153,200 NLG.

1994 GIARA grant. Title: Using agrometeorological network data for improved arid and semi-arid agrosystem management". With Brazil. Cooperating Investigator, for 3 years. Budget: Total: 166,000 DM.

1998 BARD grant. Title: "Modifying solar radiation to increase water use efficiency, yield, and fruit quality in citrus". Principal Investigator, for 3 years. Budget: Total: $295,000; Researcher's part: $40800/year.

1997 EC FP5RTD grant. Title: "HORTIMED: Sustainable water use in Mediterranean horticulture". Cooperating Investigator, for 3 years. Budget: Total: 1,226,000 ECU; Researcher's part: $10000/year.

2001 BARD grant. Title: "Influence of hydraulic properties of rootstocks and the rootstock-scion graft on water use and productivity of apple trees". Principal Investigator, for 1 year. Budget: Total: $100,800; Researcher's part $21000.

2001 BARD grant. Title: "Comparing the performance of naturally ventilated and fan-ventilated greenhouses". Cooperating Investigator, for 3 years. Budget: Total $324,000; Researcher's part: $5000/year.

2002 CDR grant. Title: Increasing the water use efficiency and crop yield under saline conditions using low-pressure drip irrigation and meteorological data. With Ghana. Cooperating Investigator, for 3 years. Budget: Total in Israel: $98400; Researcher's part: $5000/year.

2005 BARD-TIE grant. Title: "Improved analysis of thermally sensed crop water status and mapping spatial variability for site specific irrigation scheduling". Cooperating Investigator, for 3 years. 304-0370-501 Budget: Total $300,000; Resaercher's part $10000/year.

2006 International Atomic Energy Agency. Research Contract Award. Title: "The influence of shading on water use efficiency of high value agricultural crops using nuclear-isotopic and conventional techniques". Principal Investigator, for one year. Budget: Total $10000; Researcher's part: $10000. Extended for a second year in 2007. Budget: Total $8750; Researcher's part $8750.

2006 BARD grant. Title: Application of turbulent transport techniques for quantifying whole canopy evapotranspiration in large agricultural structures: measurement and theory. Cooperating Investigator, for three years. Budget: Total $300000; Researcher's part $15000/year.

2008 GIF grant. Title: The contribution of vegetation to urban heat island mitigation in the global climate change era. Principal Investigator, for three years. Budget: Total $91000/year; Researcher's part $14000/year.

2011 BARD grant. Title: Micrometeorological methods for inferring whole canopy evapotranspiration in large agricultural structures: measurements and modelling. Cooperating Investigator, for three years. Budget: Total $300000; Researcher's part $15000/year.

2017 Israeli-French High Council for Scientific & Technological Research. Research Program "Maïmonide-Israel". Title: Identifying woody species at risk due to climate change in Israel. Cooperating Investigator, for two years. Budget: $50000/year

2018 BARD grant. Title: Future of Water for Irrigation in California and Israel. BARD award for organizing an international workshop in California in 2018. Principal Investigator, for one year. Budget: $50000.

(B) National Competitive grants

1994 Chief Scientist of the Ministry of Agriculture grant. Title: Reducing radiative drought stress as a means to improving water use efficiency - 306-251-94. Cooperating Investigator, for 1 year. Budget: Total 60000 NIS.

1994 Chief Scientist of the Ministry of Agriculture grant. Title: Increasing concentrated yield of melons by manipulating plant architecture and density - 306-297-94. Cooperating Investigator, for 2 years. Budget: Total 10000 NIS/year

1995 Chief Scientist of the Ministry of Agriculture grant. Title: "Improving irrigation efficiency by combining soil, plant and climatic control methods" - 306-286-95. Cooperating Investigator, for 3 years. Budget: Total 170000 NIS/year

1996 Chief Scientist of the Ministry of Agriculture grant. Title: "Developing a canopy structure measurement protocol for apple orchards" - 306-0279-96, Principal Investigator, for 3 years. Budget: Total 60000 NIS/Year.

1998 Chief Scientist of the Ministry of Agriculture grant. Title: "Estimation of orchard transpiration for irrigation management in conditions of varying soil moisture" - 306-0353-98, Principal Investigator, for 3 years. Budget: Total 120000 NIS/Year).

1998 Chief Scientist of the Ministry of Agriculture grant. Title: "Effect of uncontrolled transient water stress on growth and yield of cotton that is irrigated in alternate rows" - 306-0348-98, Principal Investigator, for 3 years. Budget: Total 70000 NIS/Year.

1998 Chief Scientist of the Ministry of Agriculture cooperative grant with China. Title: “Irrigation and fruit size management of apple orchards in conditions of varying soil moisture” – 306-0387-98, Principal Investigator, for 3 years Budget: Total 60000 NIS/Year.

1999 Chief Scientist of the Ministry of Agriculture grant. Title: "Improving irrigation efficiency by combining soil, plant and climatic control methods" - 356-360-00. Cooperating Investigator, for 3 years. Budget: Total 100000 NIS/Year.

2000 Chief Scientist of the Ministry of Agriculture grant. Title: "Microclimate of crops under screens" - 306-400-00. Principal Investigator, for 3 years. Budget: Total 80000 NIS/Year.

2000 Chief Scientist of the Ministry of Agriculture grant. Title: "Efficient use of control systems in broiler houses to improve thermoregulation in hot environments" - 356-360-00. Cooperating Investigator, for 3 years. Budget: Total 100000 NIS/Year.

2001 Chief Scientist of the Ministry of Agriculture grant. Title: "Improving irrigation scheduling by fitting emitter discharge rates to tree foliage volume using computerized aerial photogrammetry" - 868-0204-01. Cooperating Investigator, for 3 years. Budget: Total 100000 NIS/Year.

2002 Chief Scientist of the Ministry of Agriculture grant. Title: "Factors influencing water use efficiency of apple rootstocks" - 306-401-02. Principal Investigator, for 3 years. Budget: Total $23000/Year.

2003 Chief Scientist of the Ministry of Agriculture grant. Title: "The effect of shade nets on water consumption, fruit quality and microclimate in apple orchards" - 306-457-03. Cooperating Investigator, for 3 years + 2 year extension. Budget: Total $23000/Year.

2004 Chief Scientist of the Ministry of Agriculture grant. Title: "Overexpression of aquaporins in field crops to increase water use efficiency" - 04-0146-259. Cooperating Investigator, for 3 years. Budget: Total $23000/Year; Researcher's part $7500/year.

2004 Chief Scientist of the Ministry of Agriculture grant. Title: "Saving water by protecting banana plantation with shade nets: microclimatological and physiological effects " - 304-0285-04. Cooperating Investigator, for 3 years + 2 year extension. Budget: Total $30000/Year; Researcher's part $5000/year.

2004 Keren Menahel grant. Title: "Developing technologies based on thermal imaging for controlling precision agriculture: irrigation scheduling in the orchard for decreasing variability of crop water status", 458-0349-04. Cooperating Investigator, for 1 year. Budget: Total $25000/Year; Researcher's part $7000/year.

2005 Ministry of Science grant. Title: Development of tools to reduce within-vineyard variability for the improvement of wine quality. 304-0361-561 Cooperating Investigator, for 3 years. Budget: Total $30000/Year; Researcher's part $10000/year.

2005 Chief Scientist of the Ministry of Agriculture grant. Title: " Improving the efficiency of greenhouse climate control and irrigation by monitoring average photosynthesis and transpiration". Cooperating Investigator, for 3 years. Budget: Total $30000/Year; Researcher's part $2000/year.

2005 Chief Scientist of the Ministry of Agriculture grant. Title: "Covering the soil with polyethylene sheets as a tool for controlling leaf disease in greenhouse vegetable production" – 304-1203-561. Cooperating Investigator, for 3 years. Budget: Total $30000/Year; Researcher's part $15000/year.

2006 Chief Scientist of the Ministry of Agriculture grant. Title: "Irrigation management for persimmon based on climatic, soil and plant measures" – 304-0330-06. Principal Investigator, for 3 years. Budget: Total $25000/Year; Researcher's part $20000/year.

2006 Chief Scientist of the Ministry of Agriculture grant. Title: " Use of plant hormones to increase leaf conductance, water use efficiency and productivity in Citrus" – 304-0328-06. Principal Investigator, for 3 years. Budget: Total $25000/Year; Researcher's part $12500/year.

2007 Chief Scientist of the Ministry of Agriculture grant. Title: Saving water by protecting banana plantation with shade nets: microclimatological and physiological effects. Cooperating Investigator for 2 years. Budget: Total: $24,000/year; Researcher's part: $5,000/year.

2009 Israel Water Authority. Title: Evaporation from water reservoirs in different climatic regions in Israel: measurements and modeling. Cooperating Investigator for 3 years. Budget: Total: $35,000/year; Researcher's part: $8,000/year.

2009 Chief Scientist of the Ministry of Agriculture grant. Title: Improving the evapotranspiration estimation of orchards and vegetable crops covered with screens. Cooperating Investigator for 3 years. Budget: Total: $25,000/year; Researcher's part: $5000/year.

2009 Chief Scientist of the Ministry of Environmental Protection grant. Title: Analysis of changes in evaporation and related factors in Israel in recent decades. Cooperating Investigator for 2 years. Budget: Total: $16,350/year; Researcher's part: $11000/year.

2009 Chief Scientist of the Ministry of Agriculture grant. Title: Optimization of apple irrigation under shading screens. Cooperating Investigator for 2 years. Budget: Total: $25,000/year; Researcher's part: $9000/year.

2009 Chief Scientist of the Ministry of Agriculture grant. Title: Optimization of covering banana plantations with screens: The effect of the screen texture on the water consumption, microclimate, growth and yield. Cooperating Investigator for 3 years.
Budget: Total: $30,000/year; Researcher's part: $6,500/year.

2009 Chief Scientist of the Ministry of Agriculture grant. Title: A cheap technology for real time measurement of water consumption of industrial tomato in the Hula valley. Cooperating Investigator for 3 years.
Budget: Total: $43,000/year; Researcher's part: $11,000/year.

2010 Chief Scientist of the Ministry of Agriculture grant. Title: Developing an automated irrigation protocol for nectarine and peach based on soil and plant water stress sensors. Cooperating Investigator for 2 years.
Budget: Total: $80,000/year; Researcher's part: $15,000/year.

2011 Chief Scientist of the Ministry of Agriculture grant. Title: Development of a cheap method of measuring crop water use under screens by the "surface renewal" technique. Cooperating Investigator for 3 years.
Budget: Total: $35,000/year; Researcher's part: $8,000/year.

2011 Israel Forestry Management. Title: Monitoring water budjet and adjusting the thinning regime as a tool for managing forests in water limited environments. Cooperation Investigator for 3 years.
Budget: Total: $30,000/year; Researcher's part: $5,000/year.

2012 Chief Scientist of the Ministry of Agriculture grant. Title: Developing an automated irrigation protocol for nectarine and peach based on soil and plant water stress sensors. Principal Investigator for 2 years.
Budget: Total: $30,000/year; Researcher's part: $10,000/year.

2012 Chief Scientist of the Ministry of Agriculture grant. Title: Evaluation of soil degradation as a result of long term effluent irrigation and its influence on orchard productivity. Cooperating Investigator for 3 years.
Budget: Total: $105,000/year; Researcher's part: $25,000/year.

2014 Chief Scientist of the Ministry of Agriculture grant. Title: Evaluation of crop evapo-transpiration in small plots using the 'surface renewal' method. Cooperating Investigator for 3 years.
Budget: Total: $40,000/year; Researcher's part: $10,000/year.

2014 Chief Scientist of the Ministry of Agriculture grant. Title: Developing a protocol for increasing winter cherry tomato productivity by controlling daytime temperature in greenhouses in Ramat Hanegev. Cooperating Investigator for 3 years.
Budget: Total: $40,000/year; Researcher's part: $5,000/year.

2015 Chief Scientist of the Ministry of Agriculture grant. Title: Prediction of midday stem water potential to eliminate the required use of the pressure chamber for irrigation scheduling. Cooperating Investigator for 3 years.
Budget: Total: $40,000/year; Researcher's part: $20,000/year.

2015 Chief Scientist of the Ministry of Agriculture grant. Title: Influence of dynamic changes in shade screen properties on irrigation and fertilization: Screenhouse bananas as a model
Principal Investigator for 3 years.
Budget: Total: $30,000/year; Researcher's part: $17,000/year.

2015 Chief Scientist of the Ministry of Agriculture grant. Title: Development of water use estimates and irrigation indicators, based on the Penman-Monteith Equation, for peppers grown in screenhouse and greenhouses. Cooperating Investigator for 3 years.
Budget: Total: $35,000/year; Researcher's part: $10,000/year.

2016 Chief Scientist of the Ministry of Agriculture grant. Title: An innovative model for predicting crop microclimate and evapotranspiration in screenhouses: calibration and field validation. Cooperating Investigator for 3 years.

Budget: Total: $35,000/year; Researcher's part: $10,000/year.

2016 Chief Scientist of the Ministry of Agriculture Interdisciplinary initiative (meizam) grant. Title: Evalutation of treatments to mitigate damage from long term irrigation with treated sewage effluents in an Avocado orchard on clay soil. Cooperating Investigator for 3 years. Budget: Total: $100,000/year; Researcher's part: $20,000/year.

2017 Chief Scientist of the Ministry of Agriculture – Collaboration with Japan. Title: Treatment, use and impact of wastewater of different quality in agriculture. Cooperating Investigator for 3 years. Budget: Total: $70,000/year; Researcher's part: $20,000/year.

2017 Chief Scientist of the Ministry of Agriculture – Collaboration with Japan. Irrigation of protected crops during their initial growth using dynamic ET estimates and its effect on yield. Cooperating Investigator for 3 years. Budget: Total: $70,000/year; Researcher's part: $20,000/year.

2018 Chief Scientist of the Ministry of Agriculture grant. Title: Influence of dynamic changes in shade screen properties on irrigation and fertilization: Screenhouse bananas as a model – continuation.
Principal Investigator for 2 years.
Budget: Total: $30,000/year; Researcher's part: $17,000/year.

(C) Other research grants:

2001 Vegetable Board grant. Title: "Microclimate of crops under screens" - 306-400-00. Principal Investigator, for 3 years. Budget: Total $5000/Year; Researcher's part: $5000/year.

2005 The Vegetable Board:

Improving greenhouse control by using average values of transpiration and photosynthesis. (Cooperating investigator for 3 years). Budget: Total of $3300/year for 3 years.

2008 Mekorot research contract. Title: "Estimating evaporation from the Eshkol Reseroir. 304-0333-800. Cooperating Investigator, for 1 year. Budget: Total $25000; Researcher's part $8000.

2010 Mekorot research contract. Title: "Estimating evaporation from Reservoirs. 304-0333-500. Cooperating Investigator, for 1 year. Budget: Total $15000/year; Researcher's part $5000/year.

2011 The Vegetable Board:

Reducing heat and humidity loads in screenhouses by using passive climate control. (Cooperating investigator, for 3 years). Budget: Total of $26,300 first year. Total of $13,200 second year.

XI. Awards and Scholarships

1984: Recipient of the First Annual Award of the Israeli Meteorological Society, in honor of the Pioneers of Israeli Meteorology, for the best Ph.D. thesis in Meteorology in 1983-1984.

1995 Recipient of a scholarship from the Pro Renova Cultura Hungariae Foundation. See Section IV. Special Invitations.

2009/10 Bullard Fellowship. Harvard Forest of Harvard University. Mass, USA.

2019 Outstanding career award. ARO Volcani Center, Rishon Lezion, Israel

SHABTAI COHEN March 2018

Part II. LIST OF PUBLICATIONS

All publications have been classified into four major categories: The letter following each number indicates the appropriate category

A Publications exclusively within the candidate's research group (including graduate and post-graduate students, technicians, associated scientists, etc.)
b Joint publications with other research group(s) in which the candidate plays the major role.
C Joint publications with other research groups in which the candidate's contribution is comparable in weight to that (those) of the other research groups.
d Joint publications with other research groups in which the candidate's group plays a secondary role.

1. Articles in reviewed journals:

1.a Cohen, S.S., J. Gale, A. Shmida, A. Poljakoff-Mayber and Suraqui, S. (1981)
Xeromorphism and potential rate of transpiration on Mt. Hermon, an East Mediterranean mountain.
J. Ecol. 69: 391-403. IF 4.60

2.a **Cohen, S.** and Cohen, Y. (1983).
Field studies of leaf conductance response to environmental variables in Citrus.
J. Applied Ecol. 20(2): 561-570. IF 4.197

3.a Cohen, Y., M. Fuchs, and **Cohen, S.** (1983).
Resistance to water uptake in a mature Citrus tree.
J. Exp. Bot. 34(141): 451-460 IF 4.271;Rank 14/173

4.a **Cohen S.** and Fuchs, M. (1987)
The distribution of leaf area, radiation, photosynthesis and transpiration in a Shamouti orange hedgerow orchard, I. leaf area and radiation.
Agric. For. Meteorol. 40: 123-144. IF 3.197; Rank 3/61

5.a **Cohen, S**., M. Fuchs, S. Moreshet and Cohen, Y. (1987).
The distribution of leaf area, radiation, photosynthesis and transpiration in a Shamouti orange hedgerow orchard, II. photosynthesis, transpiration, and the effect of row shape and direction..
Agric. For. Meteorol. 40: 145-162. IF 3.197; Rank 3/61

6. b Cohen, A., A. Goell, **S. Cohen**, and Ismajovitch, R. (1988)
Effects of leaf distribution in the canopy on the total dry matter production in grapefruit trees.
Isr. J. Bot. 37: 257-266.

7.a **Cohen, S.**, P. Mosoni and M. Meron (1995)
Canopy clumpiness and radiation penetration in a young hedgerow apple orchard.
1) Agric. For. Meteorol. 76:185-200. IF 3.197; Rank 3/61

8.a **Cohen, S.** and G. Stanhill (1996)

Contemporary climate change in the Jordan Valley.
J. Appl. Meteorol. 35(7): 1051-1058.

9.a **Cohen, S.**, S. Moreshet, L. LeGuillou, J.-C. Simon, and M. Cohen. (1997)
Response of citrus trees to modified radiation regime in semi-arid conditions.
J. Exp. Bot. 48(306): 35-44. IF 4.271;Rank 14/173

10.a Stanhill, G. and **S. Cohen**. (1997)
Recent changes in the surface radiation balance of Antarctica.
Journal of Climate 10(8):2078-86. IF 3.363

11.a **Cohen, S.**, R. Sudhakara Rao, and Y. Cohen. (1997)
Canopy transmittance inversion with a line quantum probe in a row crop.
Agric. For. Meteorol. 86:225-234. IF 3.197; Rank 3/61

12.a Moreshet, S., **S. Cohen**, Z. Assor, and M. Bar-Joseph. (1998)
Water relations of citrus exocortis viroid-infected grapefruit trees in the field.
J. Exp. Bot. 49(325):1421-1430. IF 4.271;Rank 14/173

13.a **Cohen, S.** and M. Fuchs. (1999).
Measuring and predicting radiometric properties of reflective shade nets and thermal screens.
Journal of Agricultural Engineering Research 73:245-55.

14.c Meron, M., **S. Cohen**, and G. Melman (2000).
Tree shape and volume measurement by light interception and aerial photogrammetry.
Trans. ASAE 43(2):475-481 .

15.a Li, F.**, **S. Cohen**, A. Naor, K. Shaozong and A. Erez (2002).
Studies of canopy structure and water use of apple trees on three rootstocks.
Agricultural Water Management 55(1): 1-14 IF 2.016

16.b **Cohen, S.** and A. Naor (2002).
The effect of three rootstocks on water use, canopy conductance and hydraulic parameters of apple trees; and predicting canopy from hydraulic conductance.
Plant Cell and Environment 25(1):17-28. IF 5.081; Rank 9/173

17.b Assouline, S., **S. Cohen**, D. Meerbach, T. Harodi, and M. Rosner(2002).
Microdrip Irrigation of Field Crops - Effect on Yield, Water Uptake, and Drainage in Sweet Corn.
Soil Science Society of America Journal. 66:228-235

18.a Li, Y.**, M. Fuchs, **S. Cohen**, Y. Cohen & R. Wallach (2002).
Water uptake profile response of corn to soil moisture depletion.
Plant Cell and Environment 25(4):491-500.

19.a **Cohen, S.,** A. Ianitz and G. Stanhill (2002)
Evaporative climate changes at Bet-Dagan, Israel, 1964-1998.
Agricultural and Forest Meteorology 111(2):83-91. IF 3.197; Rank 3/61

20.c David, T.S., M. I. Ferreira, J. S. Pereira, **S. Cohen** and J. S. David (2002).
Transpiração em Árvores Isoladas de um Montado de Azinho. Evolução Sazonal e Condicionantes Hidráulicas
Silva Lusitana, 10 (2):133-149 (in Portugese).

21.a Raveh, E., **S. Cohen**, T. Raz, D. Yakir, A. Grava and E.E. Goldschmidt (2003).
Increased growth of young citrus trees under reduced radiation load in a semi-arid climate.
Journal of Experimental Botany, 54 (381):365-373. IF 4.271;Rank 14/173

22.a Tanny, J., **S. Cohen** (2003).
The effect of a small shade net on the properties of wind and selected boundary-layer parameters above and inside a citrus orchard.
Biosystems Engineering 84(1):57-67.

23.a Tanny, J., **S. Cohen**, M. Teitel (2003).
Screenhouse microclimate: an experimental study.
Biosystems Engineering 84(3):331-341.

24.b Schiller, G., ED Unger, Y. Moshe, **S. Cohen** and Y. Cohen. (2003).
Estimating water use by sclerophyllous species under east Mediterranean climate: II. The transpiration of *Quercus calliprinos* Webb. in response to silvicultural treatments.
Forest Ecology and Management 179:483-495.

25.b **Cohen, S.**, Bennink, J. and M. Tyree. (2003)
Air method measurements of apple vessel length distributions with improved apparatus and theory.
Journal of Experimental Botany, 54(389):1889-1897 IF 4.271;Rank 14/173

26.b Naor, A., **S. Cohen** (2003).
Response of apple tree stem diameter, midday stem water potential and transpiration rate to a drying and recovery cycle.
Hortscience 38(4):547-551

27.d Li, F., Kang, S., Zhang, J. and **S. Cohen** (2003).
Effects of atmospheric CO_2 enrichment, water status and applied nitrogen on water- and nitrogen-use efficiencies of wheat.
Plant and Soil 254:279-289.

28.a Li, Y.**, Cohen, Y., Wallach, R., **Cohen, S.,** and M. Fuchs (2004).
On quantifying soil water deficit of a partially wetted root zone by the response of canopy or leaf conductance.
Agricultural Water Management 65:21-38. IF 2.016

29.c Yahav, S., A. Straschnow, D. Luger, D. Shinder, J. Tanny, and **S. Cohen** (2004).
Ventilation, sensible heat loss, broiler energy, and water balance under harsh environmental conditions.
Poultry Science 83:253-258.

30.c David, T.S., M. I. Ferreira, **S. Cohen,** J. S. Pereira and J. S. David (2004).
Seasonal trends and hydraulic limits of transpiration from an isolated *Quercus rotundifolia* Lam. tree in southern Portugal.
Agricultural and Forest Meteorology 122:193-205. IF 3.197; Rank 3/61

31.a Moller, M., J. Tanny, Y. Li, and **S. Cohen** (2004).
Measuring and predicting evapotranspiration in an insect-proof screenhouse
Agricultural and Forest Meteorology 127:35-41. IF 3.197; Rank 3/61

32.c Li, Y., H. Xu, and **S. Cohen** (2005).
Long term hydraulic acclimation to soil texture and radiation load in cotton.
Plant, Cell and Environment 28:492-499. IF 5.081; Rank 9/173

33.a Stanhill,G., and **S. Cohen** (2005).
Solar radiation changes in the United States during the 20th Century: Evidence from sunshine duration measurements.
Journal of Climate 18(10):1503-1512.

34.a **Cohen, S.,** Raveh,E., Li,Y., Grava, A., and E.E. Goldschmidt (2005).

Physiological responses of leaves, tree growth and fruit yield of grapefruit trees under reflective shade screens.
Scientia Horticulturae 107(1):25-35

35.a Agele, S., **S. Cohen**, S. Assouline (2006).
Hydraulic characteristics and water relations of net house-grown bell pepper as affected by irrigation regimes in a Mediterranean climate.
Environmental and Experimental Botany 57:226-235

36.c Assouline, S., Moller,M., **S. Cohen**, M. Ben-Hur, A. Grava, K. Narkis, A. Silber. (2006).
Soil-plant system response to pulsed drip irrigation and salinity: bell pepper case study.
Soil Science Society of America Journal 70:1556-1568

37.a Tanny, Y., L. Haijun, **S. Cohen** (2006).
Airflow characteristics, energy balance and eddy covariance measurements in a banana screenhouse.
Agricultural and Forest Meteorology, 139, 105-118.

38.b Moller, M., V. Alchanatis, Y. Cohen, M. Meron, J. Tsipris, A. Naor, V. Ostrovsky, M. Sprintsin, **S. Cohen** (2007).
Use of thermal and visible imagery for estimating crop water status of irrigated grapevine.
Journal of Experimental Botany 58(4):827-838 IF 4.271;Rank 14/173

39.c Schiller, G., **S. Cohen**, ED Unger, Y. Moshe, and N. Herr. (2007).
Estimating water use by sclerophyllous species under east Mediterranean climate: III. Tabor oak forest sap flow distribution and transpiration.
Forest Ecology and Management 238:147-155

40.b Sprintsin, M.**, A. Karnieli, P. Berliner, E. Rotenberg, D. Yakir and **S. Cohen**. (2007).
The effect of spatial resolution on the accuracy of leaf area index estimation for a forest planted in the desert transition zone
Remote Sensing and Environment 109:416-428

41.b **Cohen, S.**, A. Naor, J. Bennink, A. Grava and M. Tyree. (2007).
Hydraulic resistance components of mature apple trees on rootstocks of different vigours.
Journal of Experimental Botany 58(15-16):4213-4224 IF 4.271;Rank 14/173

42.a Hai-jun, L., **S. Cohen**, J. Tanny and G. Huang. (2007).
Transpiration of banana plant measured by Granier method.
Chinese Journal of Applied Ecology 18(1):35-40

43.c Levin, M., J. H. Lemcoff, **S. Cohen**, and Y. Kapulnik. (2007).
Low air humidity increases leaf specific hydraulic conductance of *Arabidopsis thaliana* (L.) Heynh (Brassicaceae).
Journal of Experimental Botany 58 (13):3711-3718 IF 4.271;Rank 14/173

44.c Assouline, S., S.W. Tyler, J. Tanny, **S. Cohen**, E. Bou-Zeid, M.B. Parlange, and G.G. Katul. (2007).
Evaporation from three water bodies of different sizes and climates : Measurements and Scaling Analysis.
Advances in Water Resources 31: 160-172.

45.a Stanhill,G., and **Cohen, S.** (2008).

Solar radiation changes in Japan during the 20th century: evidence from sunshine duration measurements.
Journal of the Meteorological Society of Japan 86(1):57-67

46.a Tanny, J., **Cohen, S.**, Assouline, S., Lange, F., Grava, A., Berger, D., Teltch, B., Parlange, M.B. (2008).
Evaporation from a small water reservoir: direct measurements and estimates.
Journal of Hydrology 351: 218-229.

47.d Yang, L., Li, T., Li, F., Lemcoff, H., **Cohen, S.** (2008).
Fertilization regulates soil enzymatic activity and fertility dynamics in a cucumber field.
Scientia Horticulturae 116:21-26

48.a Cohen, Y., **Cohen, S.**, Cantuarias Aviles, T. and G. Schiller. (2008).
Variations in the radial gradient of sap velocity in trunks of forest and fruit trees.
Plant and Soil 305:49-59

49.a Hai-Jun Liu, **Cohen, S.**, Tanny, J., Lemcoff, J. H. and G. Huang. (2008).
Transpiration estimation of banana (Musa sp.) plants with the thermal dissipation method.
Plant and Soil 308:227-238

50.a Hai-Jun Liu, **Cohen, S.**, Tanny, J., Lemcoff, J. H. and G. Huang. (2008).
Estimation of banana (Musa sp.) plant transpiration using a standard 20 cm pan in a greenhouse.
Irrigation and Drainage Systems 22:311-323

51.a Tanny, J., Moller, M., and **Cohen, S.** (2009).
Aerodynamic properties of boundary layers along screens.
Biosystems Engineering 102:171-179 IF 1.102

52.c Langensiepen, M., Fuchs, M., Bergamaschi, H., Moreshet, S., Cohen Y., Wolff, P., Jutzi, S.C., **Cohen, S**., Rosa, L.M.G., Li, Y. and Fricke, T. (2009).
Quantifying the uncertainties of transpiration calculations with the Penman–Monteith equation under different climate and optimum water supply conditions
Agricultural and Forest Meteorology 149:1063-1072

53.a Stanhill,G., and **Cohen, S.** (2009).
Is solar dimming global or urban? Evidence from measurements in Israel between 1954 and 2007.
Journal of Geophysical Research – Atmospheres 114, D00D17, doi:10.1029/2009JD011976.

54.b Sprintsin**, M., Karnieli, A., Sprintsin, S., **Cohen, S.**, Berliner, P. (2009).
Relationships between Stand Density and Canopy Structure in a Dryland Forest as Estimated by Ground-based Measurements and Multi-spectral Spaceborne Images
Journal of Arid Environments 73:955-962

55.b Sprintsin**, M., Karnieli, A., Berliner, P., Rotenberg, E., Yakir, D., **Cohen, S.**, (2009).
Evaluating the performance of the MODIS Leaf Area Index (LAI) product over a Mediterranean dryland planted forest
International Journal of Remote Sensing 30 (19):5061-5069

56.d Damari Weissler, H., Rachmilevitch, S., Aloni, R., German, M., **Cohen, S.**, Zwienicki, M., Holbrook, M. N., Granot, D. (2009).

LeFRK2, a gene encoding the major fructokinase in tomato plants (Lycopersicon esculentum), is required for phloem and xylem differentiation and the transport of both sugar and water
Planta 230 **(**4): 795-805

57.d Levin, M., Resnick, N., Rosianskey, Y., Kolotilin, I., Wininger, S., Lemcoff, H., **Cohen, S.**, Galili, G., Koltai, H., Kapulnik, Y. (2009)
Transcriptional profiling of Arabidopsis thaliana plants' response to low relative humidity suggests a shoot-root communication
Plant Science 177(5):450-459 DOI: 10.1016/j.plantsci.2009.07.010

58.d Shtienberg, D., Elad, Y., Bornstein, M., Ziv, G., Grava, A., **Cohen, S.**, (2009)
Polyethylene mulch modifies greenhouse microclimate and reduces infection of *Phytophthora infestans* in tomato and *Psuedoperonospora cubensis* in cucumber
Phytopathology 100 (1):97-104

59.a Agele, S., **Cohen, S.** (2009).
Effect of genotype and graft type on the hydraulic characteristics and water relations of grafted melon
Journal of Plant Interactions 4(1):59-66

60.c Naama Raz Yaseef, N., Yakir, D., Rotenberg, E., Schiller, G., **Cohen, S.** (2010).
Ecohydrology of a semi-arid forest: partitioning among water balance components and its implications for predicted precipitation changes.
Ecohydrology 3: 143-154.

61.c Schiller, G., Ungar, E. D., **Cohen, S.**, Herr, N. (2010).
Water use by Tabor and Kermes oaks growing in their respective habitats in the lower Galilee region of Israel
Forest Ecology and Management 259: 1018-1024.

62.d Alchanatis, V., Cohen, Y., **Cohen, S.,** Moller, M., Sprintsin, M., Meron, M., Tsipris, Y., Saranga, Y., Sela, E. (2010).
Evaluation of different approaches for estimating and mapping crop water status in cotton with thermal imaging
Precision Agriculture 11(1):27-41.

63.a Tanny, J., Dicken, U., **Cohen, S.** (2010).
Vertical variation in turbulence statistics and energy balance in a banana screenhouse
Biosystems Engineering 106:175-187 IF 1.102

64.a Moller, M., **Cohen, S.,** Pirkner, M., Israeli, Y., Tanny, J. (2010).
Transmission of short-wave radiation by agricultural screens.
Biosystems Engineering 107:317-327 IF 1.102

65.b Sprintsin, M., **Cohen, S.**, Maseyk, K., Rotenberg, E., Grünsweig, J., Karnielli, A., Berliner, P. and Yakir, D. (2011).
Long term and seasonal courses of leaf area index in a semi-arid forest plantation.
Agricultural and Forest Meteorology 151:565-574 IF 3.197; Rank 3/61

66.a Tanny, J., **Cohen, S.**, Berger, D., Teltch, B, Mekhmandarov, Y., Bahar, M., and Assouline, S. (2011).
Evaporation from a reservoir with fluctuating water level: correcting for limited fetch.
Journal of Hydrology 404:146-156

67.c Klein, T., **Cohen, S.**, and Yakir, D. (2011).
Hydraulic adjustments underlying drought resistance of *Pinus halepensis*.

Tree Physiology 31:637-648

68.c Teitel, M., Atias, M., Schwartz, A., and **Cohen, S.** (2011).
Use of a greenhouse as an open chamber for canopy gas exchange measurements: methodology and validation.
Agricultural and Forest Meteorology 151: 1346-1355 IF 3.197; Rank 3/61

69.c Raz Yaseef, N., Yakir, D., Schiller, G., **Cohen, S.** (2012).
Dynamics of evapotranspiration partitioning in a semi-arid forest as affected by temporal rainfall patterns.
Agricultural and Forest Meteorology 157: 77-85 IF 3.197; Rank 3/61

70.a Stanhill,G., Rosa, R. and **Cohen, S.** (2012).
The roles of water vapor, rainfall and solar radiation in determining air temperature change measured at Bet Dagan, Israel between 1964 and 2010
International Journal of Climatology 33(7):1772-1780

71.d Sperling,O., Shapira,O., **Cohen, S.**, Tripler, E., Schwartz,A. and Lazarovitch, N. (2012).
Estimating sap flux densities in date palm trees using the heat dissipation method and weighing lysimeters.
Tree Physiology 32(9):1171-1178, doi:10.1093/treephys/tps070

72.c Klein, T., Di Matteo, G., Rotenberg, E., **Cohen, S.**, Yakir, D. (2012).
Differential ecophysiological response of a major Mediterranean pine species across a climatic gradient.
Tree Physiology 33(1):26-36 10.1093/treephys/tps116

73.c Dicken, Uri, **Cohen, S.,** Tanny, J. (2013).
Effect of plant development on turbulent fluxes of a screenhouse banana plantation.
Irrigation Science 31(4):701-713 DOI 10.1007/s00271-012-0346-0

74.c Dicken, Uri, **Cohen, S.,** Tanny, J. (2013).
Examination of the Bowen Ratio energy balance technique for evapotranspiration estimates in screenhouses
Biosystems Engineering 114:397-405

75.c Ungar, E.D., Rotenberg, E., Raz Yaseef, N., **Cohen, S.**, Yakir, D., Schiller, G. (2013).
Transpiration and annual water balance of Aleppo pine in a semiarid region: implications for forest management
Forest Ecology and Management 298:39-51

76.c Klein, T., Shpringer, I., Fikler, B., Elbaz, G., **Cohen, S.**, Yakir, D. (2013).
Relationships between stomatal regulation, water use, and water use efficiency of two coexisting key Mediterranean tree species
Forest Ecology and Management 302:34-42

77.a Paudel, I., Kanety, T., **Cohen, S.** (2013).
Inactive xylem can explain differences in calibration factors for thermal dissipation probe sap flow measurements
Tree Physiology 33:986-1001

78.b Sprintsin, M., Berliner, P., **Cohen, S.**, and Karnielli, A. (2013).

Using Multispectral Spaceborne Imagery to Assess Mean Tree Height in a Dryland Plantation

ISRN Forestry Volume 2013, Article ID 485264.
http://dx.doi.org/10.1155/2013/485264

79.c Klein, T., Rotenberg E, Cohen-Hilaleh E, Raz-Yaseef N, Tatarinov F, Ogee J, **Cohen, S.**, Yakir, D. (2014).
Quantifying transpirable soil water and its relations to tree water use dynamics in a water-limited pine forest.
Ecohydrology 7:409-419

80a Kanety, T., Naor, A., Gips, A., Dicken, U., Lemcoff, J.H., **Cohen, S.** (2014).
Irrigation influences on growth, yield and water use of persimmon trees
Irrigation Science 32:1-13

81c Branch, O., Kirsten Warrach-Sagi, Volker Wulfmeyer, **Cohen, S.** (2014).
Simulation of semi-arid biomass plantations and irrigation using the WRF-NOAH model - a comparison with observations from Israel
Hydrology and Earth System Sciences (HESS) 18:1761-1783

82.a Pirkner, M., Tanny, J., Shapira, O., Teitel, M., **Cohen, S.**, Shahak, Y., Israeli, Y. (2014).
The effect of screen type on crop micro-climate, reference evapotranspiration and yield of a screenhouse banana plantation
Scientia Horticulturae 180:32-39

83.a Stanhill,G., Achiman, O., Rosa, R. and **Cohen, S.** (2014).
The cause of solar dimming and brightening at the Earth's surface during the last half century: evidence from measurements of sunshine duration.
Journal of Geophysical Research – Atmospheres , 119, doi:10.1002/2013JD021308

84.d Cohen, Y., Alchanatis, V., Sela, E., Saranaga, Y., **Cohen, S.,** Meron, M., Bosak, A., Tsipris, J., Ostrovsky, V., Orolov, V., Levi, A., Brikman, R. (2014).
Crop water status estimation using thermography: Multi-year model development using ground-based thermal images.
Precision Agriculture, 16(3):311-329

85.a Haijun L., **Cohen S**, Lemcoff JH, Israeli Y, Tanny J. (2015).
Sap flow, canopy conductance and microclimate in a banana screenhouse.
Agricultural and Forest Meteorology 201:165-175

86.a Paudel I., Naor A, Gal Y and **Cohen S**, (2015).
Simulating nectarine tree transpiration and dynamic water storage from responses of leaf conductance to light and sap flow to stem water potential and vapor pressure deficit.
Tree Physiology 35 (4), 425-438

87.a Agra H, Ne'eman G, Shachak M, Segoli M, Gabay O, Perevolotsky A, Arnon A, Boeken B, Groner E, Walczak M, Shkedy Y, **Cohen S**, Ungar ED. (2015).
Canopy structure of woody landscape-modulators determines herbaceous-species richness along a rainfall gradient.
Plant Ecology 216:1511-1522

88.a Paudel I, Shaviv A, Bernstein N, Heuer B, Shapira O, Bar-Tal A, Rotbart N, Ephrath J, **Cohen, S.** (2015).
Lower leaf gas-exchange and higher photorespiration of treated wastewater irrigated Citrus trees is modulated by soil type and climate.

Physiologia Plantarum 156:478-496
89 .a Paudel I, **Cohen S**, Shaviv A, Bar-Tal A, Bernstein N, Heuer B, Ephrath J. 2016.
Impact of treated wastewater on growth, respiration, and hydraulic conductivity of citrus root systems in light and heavy soils.
Tree Physiology, 36 (6), 770-785
90 .d Assouline S, Li D, Tyler S, Tanny J, **Cohen S**, Bou-Zeid E, Parlange M, Katul GG. 2016.
On the variability of the Priestley-Taylor coefficient over water bodies.
Water Resources Research 52:150-163
91 .a David-Schwartz R, Paudel I, Mizrachi M, Delzon S, Cochard H, Lukyanov V, Badel E, Capdeville G, Shklar G, **Cohen S** 2016.
Indirect evidence for genetic differentiation in vulnerability to embolism in Pinus halepensis
Frontiers in Plant Science, doi: 10.3389/fpls.2016.00768
92.c Klein, T., **Cohen, S.**, Paudel, I., Preisler, Y., Rotenberg, E., Yakir, D. (2016).
Diurnal dynamics of water transport, storage and hydraulic conductivity in pine trees under seasonal drought
IFOREST Biogeosciences and Forestry 9:710-719
93.a Paudel, I., **Cohen, S.**, Shlizerman L., Jaiswal A.K., Shaviv A. and Sadka A. (2017).
Reductions in root hydraulic conductivity in response to clay soil and treated waste water are related to PIPs down-regulation in *Citrus*
Nature Scientific Reports 7: *15429* | DOI:10.1038/s41598-017-15762-2
94.a Paudel, I., Bar Tal, A., Rotbart, N., Ephrath, J., and **Cohen, S.** (2018).
Water quality changes seasonal variations in root respiration, xylem CO2, and sap pH in citrus orchards
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Part III. LIST OF MAJOR ACHIEVEMENTS

1. **General contribution to agricultural science**

i. Solar radiation at the Earth's surface had decreased significantly in the past 50 years, a phenomenon which we called "Global Dimming". Our findings received extensive scientific and media attention, including articles which quote us in the Guardian, NY Times, Nature Science update, and Scientific American. We were organizers of a session on this topic at the 2004 AGU/CGU convention in Montreal and I was chairman of the organizing committee for an international workshop on "Global dimming and brightening" which took place in Feb. 2008 at Ein Gedi. These findings and our continuing work on this topic have had a significant impact on climate change science and our findings are discussed in the most recent IPCC report. Our paper from 2001 is considered a groundbreaking paper and was cited over 250 times in the following 10 years. (Publications 1:8, 10, 33, 45, 54, ; 3:2, 3, 6, 9)

ii. Studies of evaporation, reference evaporation and evapo-transpiration. Climate change in Israel (including "Global Dimming") has caused significant changes in evaporation rates, with a direct impact on irrigation requirements. In addition to climate analyses we have been studying evaporation from reservoirs using direct methods (e.g. eddy covariance and energy balance techniques) and modeling (Publications 1:1, 8, 19, 31, 44, 46, 50, 52; 2:3; 3:5, 8).

iii. Reduced radiation load from shading with screens in citrus was shown to cause little change in transpiration due to large increases in leaf conductance. This leads to increased orchard photosynthesis and productivity, especially in young citrus trees. When shading apple and bananas the influence is less, but water use and irrigation requirements are reduced significantly. Long term adaptation to shade climate in arid regions involves changes in shoot to root ratios which tend to stabilize leaf specific hydraulic conductance (Publications 1:9, 21, 32, 34; 3:7).

iv. Study of screens and microclimate below screens has led to models to predict crop water use and microclimate, air flow and turnover rate, and screen radiometric properties for a variety of screen types and structures. This research is continuing and is including direct measurement of crop water use and

photosynthesis in screens using a variety of methods including sap flow and eddy covariance techniques. (Publications 1:9, 13, 21, 22, 23, 31, 34, 37, 51; 2:1, 2; 2a:7, 8, 11; 3:7).

v. Studies of canopy structure, water use, environmental physiology and hydrology of forests in Israel. Canopy and environment interact to determine forest water use and hydrology. My expertise in indirect and remote sensing measurements of LAI, sap flow measurements, microclimate and micrometeorological methods has led to more than a decade of collaboration in forestry projects, including work with the Volcani forestry group, and with the long term eco-hydrological studies of Yatir forest led by a group from Weizmann Inst. I also participated in the 4 year FORMAN COST action (Forest Management and the Water Cycle), serving as a member of the management and steering committees (as scientific secretary), which included hosting a visit of the group to Israel and co-editing a book for the Ecological Studies series followed by participation as management committee member in the COST action STReESS (Studing Tree Responses to Extreme Events: a Synthesis).

vi. Studies of plant water relations and especially sap flow and hydraulic parameters of plants. Hydraulic conductance of an apple dwarfing rootstock was found to be lower than others due to resistance in the graft union between rootstock and scion, but further research showed that this is not a general phenomenon. Similar work demonstrated that hydraulic conductance of Arabidopsis responds rapidly to humidity and citrus exocortis viroid blocks xylem. We built systems for measuring hydraulic conductance and sap flow in vivo and in-vitro. Improved apparatus and theory was developed for determining xylem vessel length distributions. Our work on the plant hydraulics has led to collaborations with other groups in and outside of Israel (Publications 1:2, 3, 12, 16, 18, 20, 24, 25, 26, 28, 30, 32, 35, 36, 38, 39, 41, 42, 43, 48, 49, 50, 52, 53, 55, 57, 58, 59).

vii. Theory and techniques for indirect determination of canopy structure, e.g. leaf area index (LAI) and leaf angle distributions. Crops included corn, apple orchards, and vineyards. Satellite remote sensing parameters were compared to indirect LAI in a pine forest. For irrigation management, the sensitivity of

transpiration to leaf area index was studied (Publications: 1: 7, 11, 14, 15, 40, 55, 56; 2a: 4, 9; 3:1).

viii. Advances in understanding the radiation climate and canopy structure of crops (e.g. citrus, banana and apple orchards), including numerical and analytical models of canopy structure and its influence on radiation, transpiration, and photosynthesis of orchards and natural vegetation. These models are helpful for planning irrigation and hedgerow design (see List of Publications, section I: 1, 4, 5, 6, 7, 9, 15, 52; 2a:3).

ix. Advances in understanding and predicting greenhouse microclimate. A model to predict the influence of greenhouse climate on crop productivity was developed together with collaborators in The Netherlands. My unique contribution was the introduction of Software Engineering concepts in the model's design, and in the development process. Other studies have targeted radiation distribution, ventilation rates, transpiration and energy balance of mulches (Publications 1: 50, 60; 2a;1 ,2, 10, 12).

2. **Achievements in applied research specifying major contribution to agriculture in Israel and abroad.**

i. We have shown that reduced radiation load in citrus, apple and banana orchards can increase orchard productivity and water use efficiency. The results are a key to understanding one of the benefits of protected agriculture, in that leaf conductance is sometimes higher under cover than outside. In other cases reduced radiation and wind inside screen structures reduces water use significantly while increasing productivity. These and other findings about greenhouse and screenhouse climate and crop response have contributed to increased use of screen coverings and to reduced irrigation alongside increased productivity in these structures. Our group's continued research on screens and screenhouses over the past decade and a half have made us world experts on the influence of these structures on microclimate and water use.

ii. Screenhouses reduce pesticide use, and are an alternative to the more expensive greenhouse. Our study of screenhouse microclimate found that water use is reduced significantly by the internal climate. The screenhouse climate model developed has been used to predict screenhouse temperature, relative humidity, and water use of a pepper crop for different regions in Israel. This work is being extended to apples and banana's in more recent projects.

iii. Recent projects are developing platforms for using sensor suites to enable plants, soil and environment to inform of water status and requirements, and control irrigation scheduling accordingly. Previous studies of ours were oriented to improving irrigation management through introduction of canopy structure into irrigation algorithms (along with meteorological data) and use of sensors for determining crop water stress.

iv. Introduction, maintenance, adaptation and improvement of techniques for measuring:

   a. Leaf area index with radiation sensors
   b. Sap flow with heat pulse, compensation heat pulse and thermal dissipation methods.
   c. Crop water stress index with visible and thermal imaging systems.

   This work has included improvements of calibration, datalogger software, data analysis software, and electronics.

v. My Ph.D. research developed a theoretical basis for designing hedgerow Citrus orchards. The model was used to simulate and evaluate the common hedgerow shapes used in Israel. Some of these were tested in the field.

vi. The study of Citrus leaf resistance response to soil drying, and participation in the research on whole Citrus tree water relations were part of an ongoing group effort to determine optimum irrigation techniques, frequencies and quantities for Israel.

vii. I participated in the research, led by H. Bielorai and S. Dasberg, that set standards for irrigation and fertilization of Citrus in Israel and investigated

orchard response to saline irrigation. Over the years, I have had research projects investigating irrigation levels, geometry and application rate in fields of corn and cotton, pepper screenhouses, and apple, persimmon and citrus orchards. In all these projects my contributions have included measuring sap flow (actual transpiration), canopy and leaf conductance, potential transpiration, plant water potential and other parameters. Irrigation trials have usually included measurement of yields, fruit quality and other parameters of interest to agriculturalist. These have all been reported in Hebrew in various forms and have contributed to improvements in irrigation in Israel.

viii. Indirect methods for measurement of canopy structure have been developed for Israeli agriculture. Protocols are being used by a number of researchers (under my direction) on research in various agricultural and related situations. Canopy is an important determinant of crop water requirements and these measurements improve irrigation scheduling.

ix. A study of chicken energy and nitrogen balance has led to a model that can be used together with an infra-red thermal imaging system to analyze chicken thermoregulation in different climates. Several other experiments were done to quantify energy flows and ammonia production in the chicken house. The study has led to practical recommendations for relative humidity and wind regime in chicken coops (Publications 1: 29; 3:4.

x. Participation in research on the influence of long term irrigation with treated wastewater on citrus and avocado orchard productivity in heavy clay soils and the environmental physiology of the orchards. This research showed that after a transition from TWW to FW irrigation tree water use increases and a number of other orchard parameters are improved. Treatments to mitigate the influence of TWW have also been evaluated. Detrimental influences of TWW involve reduced soil aeration and increased salinity. The combined effects are apparently responsible for the long term decline in orchards irrigated with TWW on heavy soils.