**Part I: CURRICULUM VITAE**

1. **Personal**

Department of Plant Pathology and Weed Research,

Agricultural Research Organization-Volcani Center, Newe Yaar

30095 Ramat-Yishay, Israel.

Mobile: +972-54-5934252

E-mail: [maorm@volcani.agri.gov.il](mailto:maorm@volcani.agri.gov.il)

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| **Dates** | **Description** | |
| 1983 | | Born in Israel |

1. **University Education and Additional Training**

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| **Dates** | **Description** |
| 2007 – 2009 | B.Sc. in Plant science at Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem. |
| 2009 – 2012 | M.Sc. in Institute of Plant Sciences and Genetics in Agriculture at Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem.  Title of thesis: Mechanisms of multiple herbicide resistance in *Lolium rigidum*  Advisor: Prof. Baruch Rubin |
| 2012 – 2017 | Ph.D. in Institute of Plant Sciences and Genetics in Agriculture at Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem.  Title of thesis: Evolution of molecular and biochemical mechanisms endowing temperature-dependent non-target site resistance to ACCase inhibitors in grass weeds.  Advisor: Prof. Baruch Rubin and Prof. Zvi Peleg |
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| 2016 – 2019 | Postdoctoral fellowship at Department of Plant Sciences, University of California – Davis with Prof. Marie Jasieniuk.  Research subject: Elucidating the effect of elevated CO2 levels and increased temperatures on glyphosate efficacy |

1. **Positions Held and Academic Status**

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| **Dates** | **Description** |
| 2019 – Present | Research Scientist at the Department of Plant Pathology and Weed Research, Newe-Yaar, Agricultural Research Organization-Volcani Center |

1. **Teaching Experience / Guiding Students**
2. Academic Contribution:
3. Guidance of M.Sc. Students:

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| **Graduation date** | **Name** | **Title of thesis** | **Guidance with** |
| In progress | \*Mr. Uri Bar | Development of Integrated Management Protocols for swallow-wort (*Cynanchum acutum*) | Prof. Avraham Gamliel |

\*under my direct supervision

\*\* B. Sci. internship, as part of studies in ORT Braude College

1. Guidance of Ph.D. Students:
2. Post-Docs and Visiting Scientists:

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| **Dates** | **name** | **Research subject** |
| 2020 | Dr. Dhamodharan Kondusamy | Hydrothermal aqueous phase potential for pre-emergent herbicidal activity |

1. Organization of Courses:
2. **Activity in Scientific and Agricultural Committees**
3. International:

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| **Dates** | **Description and role** |
| 2019-Present | Board member at the European Weed Research Society |
| 2019-Present | Deputy leader, European Weed Research Society working group for Weed Management in Arid and Semi-Arid Climate |

1. National:

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| **Dates** | **Description** |
| 2010 – 2012 | Student representative; Weed Science Society of Israel |
| 2012 – 2016 | Secretary; Weed Science Society of Israel |
| 2019 – Present | Member of the review committee; Weed Science Society of Israel |
| 2019 – Present | Member of the official National Pesticide Registration Committee of the State of Israel. |
| 2020 – Present | Cotton Growers Council Committee; Proposal reviewer |

1. Institutional
2. **Contribution to the Scientific Community**
3. International:
4. National:

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| **Dates** | **Description** |
| 2019 | Organizer of Workshop entitled: *Invasive plants in the 21st century*, held in the Agricultural Research Organization-Volcani Center, Newe Yaar, in collaboration with the Plant Protection Israeli Services (~170 participants) |

1. Institutional:
2. Outreach:
3. Editorial responsibilities:

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| **Dates** | **Description** |
| 2016 – Present | Reviewer (ad-hoc) of manuscripts for: *Plant Science, BMC Plant Biology, PLOS ONE, Scientific Reports, Pest Management Science, Weed Science, Agriculture, Agronomy, Weed Research, Plants, Phytoparasitica, Journal of the Science of Food and Agriculture, New Phytologist, Experimental Agriculture* (overall more than 30 manuscripts) |
| 2019 | Guest editor, "Herbicide Resistance in Weed Management", a special issue of *Agronomy* (ISSN 2073-4395) |
| 2020 | Guest editor, " Biology and Management of Weeds and Invasive Plant Species under Changing Climatic and Management Regimes ", a special issue of *Frontiers in Agronomy* (ISSN: 2673-3218) |

1. Active Participation in Meetings
2. International:

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| **Date** | **Title of the Meeting** | **Place** | **Role** |
| 2017 | *Weed day, University of California – Davis* | Davis, California | Invited lecture |
| 2017 | *12th Triennial Conference - International Society for Seed Science* | Monterey, California | Invited lecture |
| 2017 | *Global Herbicide Resistance Challenge* | Denver, Colorado | Lecture |
| 2018 | *Weed Science Society of America- Annual Meeting* | Arlington, Virginia | Lecture |
| 2018 | *Canadian Weed Science Society Annual Meeting* | Niagara Falls, Canada | Invited lecture |
| 2019 | *Weed Science Society of America- Annual Meeting* | New Orleans, Louisiana | Lecture |
| 2019 | *Novel approaches for weed management in vegetable crops under arid and semi-arid conditions in Europe-EWRS* | Lisbon, Portugal | Invited lecture |
| 2019 | *EWRS training course on herbicide resistance detection – "Molecular studies in herbicide resistance"* | Antalya, Turkey | Lecture |

1. National:

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| **Date** | **Title of the Meeting** | **Role** |
| 2017 | *Plant Science Department Seminar, Weizmann Institute of science, Rehovot* | Invited Lecture |
| 2019 | *The 25th Conference of the Weed Science Society of Israel* | Invited Lecture |
| 2019 | *Invasive plants in the 21st century* | Invited Lecture |
| 2019 | *Weeds in orchards - regional meeting* | Invited lecture |
| 2019 | *Grafting in ornamental plants* | Invited lecture |
| 2019 | *Invasive weeds –* An invited seminar in the Department of Field Crops, Vegetables & Genetics Faculty of Agric. Food & Environmental Sciences, The Hebrew University of Jerusalem, Rehovot, Israel*.* | Invited lecture |
| 2019 | *Weeds in field crops - regional meeting* | Invited lecture |
| 2020 | *Shaham-Weeds in agriculture workshop* | Invited lecture |

1. Institutional:
2. **Research Grants**
3. Internationally Peer Reviewed Grants:
4. Nationally Peer Reviewed Grants:
5. National Non-Peer Reviewed Grants:

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| **Year** | **Granting Source** | **Duration (years)** | **Role\*** | **Title (short)** | **Budget** | |
| **Total (US $ / year)** | **Researcher (US $ / year)** |
| 2020 | Chief Sci. Agr./ KKL | 3 | CI | Weed management in Liliaceae crops. | 57,925.7 | 28,962.85 |
| 2020 | Chief Sci. Agr./ KKL | 3 | CI | Control of *Cynanchum actum* in palm orchards at the Arava. | 57,925.7 | 14,481.43 |
| 2020 | Tomato growers board | 1 | CI | Weeds as hosts for ToBRFV. | 7,095.9 | 3,547.95 |

\*PI = Principal Investigator; CI = Cooperating Investigator

1. Other Funds:
2. **Awards**

##### Part II: LIST OF PUBLICATIONS

Marks:

X \*                    Equal contribution as the first author

X \*\* Corresponding Author *(in cases where the researcher is the Corresponding Author)*

Marks (only for the first author):

X \*\* Corresponding Author

XS                     Student under my supervision

XT                    Technician or research engineer working in my research team

XPD, XVS           Post-Doc or Visiting Scientist working in my research team

1. **Articles in Reviewed Journals**

1. **Matzrafi M.,** Gadri Y., Frenkel E., Rubin B. and Peleg Z. (2014). Evolution of herbicide resistance mechanisms in grass weeds. *Plant Science*. 229:43-52.

IF 3.607; Category: Plant Science; Rank 27/204 (Q1)

2. **Matzrafi M.,** Whitefish Lazar T., Sibony M. and Rubin B. (2015). *Conyza* species: distribution and evolution of multiple target-site herbicide resistances. *Planta*. 242:259-267.

IF 3.239; Category: Plant Science; Rank 32/209 (Q1)

3. **Matzrafi M.,** Seiwert B., Reemtsma T., Rubin B. and Peleg Z. (2016). Climate change increases the risk of herbicide-resistant weeds due to enhanced detoxification. *Planta*. 244: 1217-1227.

IF 3.361; Category: Plant Science; Rank 30/212 (Q1)

4. Frenkel E.\*, **Matzrafi M.**\***,** Rubin B. and Peleg Z. (2017). Effects of environmental conditions on the fitness penalty in herbicide resistant *Brachypodium hybridum*. *Frontiers in Plant Science*. 8:94.

IF 3.678; Category: Plant Science; Rank 20/222 (Q1)

5. **Matzrafi M.**\*\***,** Herrmann I., Nansen C., Kliper T., Zait Y., Ignat T., Siso D., Rubin B., Karnieli A. and Eizenberg H. (2017). Hyperspectral technologies for assessing seed germination and trifloxysulfuron-methyl response in *Amaranthus palmeri* (Palmer Amaranth). *Frontiers in Plant* *Science*. 8:474.

IF 3.678; Category: Plant Science; Rank 20/222 (Q1)

6. **Matzrafi M.,** Shaar-Moshe L., Rubin B. and Peleg Z. (2017). Unraveling the transcriptional basis of temperature-dependent pinoxaden resistance in *Brachypodium hybridum*. *Frontiers in Plant Science*. 8:1064.

IF 3.678; Category: Plant Science; Rank 20/222 (Q1)

7. **Matzrafi M.**\***,** Gerson O. \*, Rubin B. and Peleg Z. (2017). Different mutations endowing resistance to acetyl-CoA carboxylase inhibitors results in changes in ecological fitness of *Lolium rigidum* plants. *Frontiers in Plant Science*. 8:1078.

IF 3.678; Category: Plant Science; Rank 20/222 (Q1)

8. **Matzrafi M.**\*\*,Brunharo C., Tehranchian P., Hanson B.D. and Jasieniuk M. (2019). Increased temperatures and elevated CO2 levels reduce the sensitivity of *Conyza canadensis* and *Chenopodium album* to glyphosate. *Scientific Reports*. 9:2228.

IF 3.998; Category: Plant Science; Rank 17/71 (Q1)

9. Tehranchian P., Nandula V.K., **Matzrafi M.** and Jasieniuk M. (2019). Multiple herbicide resistance in California Italian ryegrass (*Lolium perenne* ssp. *multiflorum*) I: characterization of ALS-inhibiting herbicide resistance. *Weed Science*. 67:273-280.

IF 2.258; Category: Agronomy; Rank 20/91 (Q1)

10. Mesgaran M.B.\*, **Matzrafi M.** and Ohadi S. (2019). Sex lability and dimorphism in diecious Palmer amaranth (*Amaranthus palmeri*). bioRxiv doi:10.1101/769935. Submitted to: *Planta*

**Since previous promotion**

11. **Matzrafi M.** \*\***,** Gerson O., Sibony M. and Rubin B. (2020). Target site resistance to acetolactate synthase inhibitors in *Diplotaxis erucoides* and *Erucaria hispanica*–Mechanism of resistance and response to alternative herbicides. *Agronomy* 10 (4), 471

IF 2.603; Category: Agronomy; Rank 18/91 (Q1)

12. Neves C.J., **Matzrafi M.**, Thiele M., Lorant A., Mesgaran M.B., Stetter M.G. (2020). Male linked genomic regions determine sex in dioecious *Amaranthus palmeri.* bioRxiv doi: 10.1101/2020.05.25.113597. Submitted to: *Heredity.*

13. **Matzrafi M.**\*\***,** Morran S. and Jasieniuk M. (2020). Recurrent selection with glufosinate at low rates reduces the susceptibility of a *Lolium perenne* ssp. *multiflorum* population to glufosinate. *Agronomy* 10, 1288.

IF 2.603; Category: Agronomy; Rank 18/91 (Q1)

14. Aly R., **Matzrafi M.** and Bari VK. (2020). Using biotechnological approaches to develop crop resistance to parasitic weeds. Submitted to: *Plant Cell Reports*.

1. **Books and Invited Reviews**

1. **Matzrafi M.\*\*** (2018), Climate change exacerbates pest damage through reduced pesticide efficacy. *Pest Management Science*. Perspective paper. 75, 9-13.

IF 3.253; Category: Agronomy; Rank 8/83 (Q1)

1. **Book Chapters**

1. Rubin B. and **Matzrafi M.** (2015).

Weed management in Israel-Challenges and approaches. In: *Weed science in the Asian-Pacific region.* (V.S. Rao, N.T. Yaduraju, N.R. Chandrasena, G. Hassan and A.R. Sharma, eds.), pp. 253-270. An Asian-Pacific Weed Sci. Soc. Public. Indian Soc. Weed Sci., Jabalpur, India.

1. **Articles in Reviewed Journals in Hebrew**

**Since previous promotion**

1. **Matzrafi M**. (2020), Concern of reduced herbicide efficacy due to climate change*. Ecology and Environment.* 10:46-48 (Hebrew).

1. **Articles in Non-Reviewed Journals in Hebrew and English**

1. **Matzrafi M.** and Rubin B. (2013), Herbicide resistant weeds – Foretold chronicle*. Nir Vatelem.* 45:20-25 (Hebrew).

1. **Articles in Symposia Proceedings (including Acta Horticulturae)**

**Since previous promotion**

1. Morran S., **Matzrafi M.,** Tehranchian P. and Jasieniuk M. (2019). Insights into the Genetic Basis of Glufosinate Resistance in Italian Ryegrass (*Lolium multiflorum*) from Californiaan. Plant and Animal Genome XXVII Conference (January 12-16, 2019).

1. **Allowed Patents and Registered Cultivars**

Part III: DESCRIPTION OF MAJOR ACHIEVEMENTS

1. **Contribution to Agricultural and/or Environmental Sciences**

**Overview:** my research is focused on weed control and management of invasive weed species under the predicted climatic change. My overall arching goal is to develop new and integrated weed management practices to reduce the damage of invasive weed species. For that, we must gain more understanding about the ecology, physiology and phenology of these species. Another important component in my research approach is knowledge dissemination with the help of field instructors and the agrochemical industry.

* 1. *Parthenium hysterophorus* is an invasive allergenic species that had invaded to 50 countries worldwide, probably with imported livestock feed. In recent years, there has been increasing concern about the spread of the invasive *P. hysterophorus* in agricultural and non-agricultural habitats across Israel. In the Matzrafi lab, we have identified and collected biotypes from six locations across Israel were *P.* *hysterophorus* has been reported within the range of agricultural fields. Sahar Malka, a M.Sc. student in my group, is currently studying the germination and phenology of each biotype. In the last year, Sahar had produced an F1 generation from each biotype and she is studying the G\*E interaction of *P.* *hysterophorus* biotypes. Several differences in both germination and flowering time were identified between biotypes. This research will help us to assess the distribution and establishment of this species in different regions across Israel. Two manuscripts related to the distribution, biology and phenology of *P.* *hysterophorus* are currently under preparation. A proposal that was submitted to the Chief Scientist of Agriculture last year is still under review.
  2. *Cynanchum acutum L.* (swallow-wort) is a perennial twining vine weed that belongs to the Asclepiadaceae family. This weed is mainly associated with wet habitats and may be found in cultivated fields, orchards, fence rows, natural areas and roadsides. Swallow-wort is widespread in the Mediterranean region from Spain, east to Iraq and in the Northern African countries. In Israel, it is typical in the Galilee, Golan Heights and in the Northern Negev. Recently, its range has expanded to the Arava valley, and it has become a major pest in date orchards, due to its unique phenological and biological characteristics. The work on swallow-wort, started as a collaboration with Dr. Ran Lati in a project led by Dr. Malkie Spodek and Dr. Jessica Schäckermann and funded by the Southern Arava R&D. In this project we are developing integrated weed management approaches for the control of swallow-wort in date palm orchards of the southern Arava. Uri Bar, a M.Sc. student in my group, is currently working on finding chemical solutions for the control of swallow-wort. Several publication are expected from my group and in collaboration with the research group from the Southern Arava R&D.
  3. *Aamaranthus palmeri*is native to dry and hot regions, and can mainly be found at the area of northwestern Mexico and southern California to New Mexico and Texas. This species is the most successful invader out of all *Amaranthus* dioecious species and have invaded many countries across the world. I have established collegial relationships with several labs including Dr. Mohsen Mesgaran and Dr. Markus Stetter. In a mutual project, we have studied the genomic mechanism of sex determination in *A. palmeri*, a weed with international significance. We have identified specific male linked genomic regions in *A. palmeri* using an alignment free k-mer comparison which enabled to identify a large number of male specific k-mers, this manuscript have been submitted to *The Plant Journal* (1-12). Our findings give insights into the evolution of sex chromosomes in plants and may shed light on mechanism of sex determination in diecious species.

1. **Achievements in Applied Research**(Specifying major contribution to agriculture and/or the environment in Israel and abroad)
   1. In my PhD, I have proved that the efficacy of ACCase inhibitors decreases under increasing temperatures (1-3 and 1-6). Moreover, I also showed that the time window for this response is 48h after herbicide application, and by that giving applicative tools for farmers to improve their herbicide performance by strategic application according to short term weather forecast. In my postdoctoral fellow at University of California – Davis, I continued this work by studying the effect of climate change related factors, such as increased temperatures and elevated CO2 levels, on glyphosate efficacy in different weed species. My study revealed that under increased temperatures and elevated CO2 levels, glyphosate sensitivity is highly decreased, implying that the weed control efficacy of glyphosate is likely to decrease under the project climate change (1-8). My work on the effect of environmental conditions and herbicide efficacy have led to several new recommendations by field instructors and changes in application recommendation on the product labels, as well as a perspective paper in one of the leading journals for pest management (2-1).
   2. After the initiation of the swallow-wort project in the Arava, we got several reports from field instructors and farmers across the country on severe damages of this weed in orchards of apple, peach, almond, lemon and avocado. In the Western Negev and the Hula valley this weed was also present in field crops such as potato and wheat at late season. In order to study swallow-wort distribution and management, I have created a working group to include farmers, field instructors, and the agrochemical industry and researchers (~60 participant) from all across the country. Using the app we gather information on the spread of swallow-wort and different field experiments conducted by the field instructors and the chemical companies. In order to find sustainable solutions and oversee all field experiments conducted across the country, I have also created a super group of leading professionals including; collaborators from the Northern R&D, Saham, Agrica®, Ministry of Agriculture and the PPIS. This project is currently being submitted to several funding opportunities such as the apple growers, almond growers and more.
   3. *Ambrosia grayi* is a new specie, first identified on 2017 at a vineyard near Zichron Yaakov and orchards at the Fureidis region. As other Ambrosia species, this is an allergenic and noxious weed that can propagate by both seeds and rhizomes. For the last year, I have been part of a team led by Daniela Cafri and Nadav Ezra from the Plant Protection and Inspection Services (PPIS), in effort to improve the chemical weed management and create more tools for the control of this specie. My group have conducted a field experiment to examine different herbicidal combinations in order to suppress the growth and establishment of *A. grayi*. Our field experiment have resulted in several promising treatments, and we are currently working to adjust the PPIS protocol accordingly. In the near future we intend to finish preparing our quarantine greenhouse, which will enable us to study the phenology and biology of this species and other quarantine invasive species under controlled environmental conditions. In light of our mutual interests, we are discussing opportunities for financial support with the PPIS and there has been great interest from the head of the PPIS, Prof. Abed Gera, to support a student for this project.
   4. Tomato brown rugose fruit virus (ToBRFV) that causes symptoms including mosaic and distortion of leaves and brown, wrinkly spots on fruits. In recent years, this virus has been identified in Israel. In a collaboration with Dr. Aviv Dombrovsky, we have studied the host range of ToBRFV. Several invasive weeds of the *Solanaceae* family such as; *Solanum elaeagnifolium*, *Solanum rostratum* and *Solanun Villosun* were found as vectors for this virus. Our work continues as we try to assess the distribution and proximity of these species in areas of extensive tomato growing. This project was initially funded by the Tomato growers board and another proposal will be submitted for further funding this year.