

## Rael Kayume BIRTHIA (PHD)

Research Scientist and Lecturer, School of Agriculture and Biotechnology, Karatina University

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### PERSONAL PROFILE

#### Personal details

Nationality: Kenyan

Date of Birth: 28<sup>th</sup> June 1980

Designation: Research Scientist and Lecturer

#### Career Profile

A university Lecturer with immense knowledge in crop protection and extensive experience in research, teaching, networking and graduate training. Highly dedicated to improving crop production in smallholder farming systems in sub-Saharan Africa and increasing Africa's competitiveness in the global arena.

#### Research interest

- Sustainable Management of plant pathogens and insect pests in subsistence farming systems
- Characterization of plant pathogen pests of vegetables.
- Capacity building in plant pathology and entomology in the region in both human and infrastructural at all levels

#### Academic and Professional Qualification

- 2013: Ph.D. Crop protection: University of Nairobi  
Ph.D. Thesis title: "Diversity, distribution and management of thrips-vectored *tomspoviruses* in onion and tomatoes".
- 2009: M.Sc. Biochemistry: Jomo Kenyatta University of Agriculture & Technology (JKUAT),  
Kenya. Majoring in Plant Pathology. M.Sc. Thesis title: "Molecular characterization & genetic diversity of Root-knot nematodes associating with tomatoes in Kenya".
- 2004 B.Sc. Science: JKUAT, Kenya. Major: Biochemistry/chemistry

#### Employment History

- **May 2015 to date:** Lecturer, Department of Crop Science (renamed to Agricultural Sciences), Karatina University, Responsibilities include; teaching undergraduate and post graduate courses in agricultural entomology, Plant pathology, applied molecular techniques, Research Proposal development, Supervision of graduate and post graduate students, writing grant proposal and community outreach programs.
- **Oct 2012 - April 2015:** Designation; Biochemist, Ministry of Health, National Public Health Laboratory services (NPHLS). **Responsibilities** include: Head of Molecular lab,

testing for toxicants in human and animal feeds, providing technical guidance on mycotoxins analysis in grains cereals and other products, research proposal development, supervision of staff in molecular and mycotoxins laboratories, drafting scientific papers, project report writing

- **Sep 2009 - Oct 2012:** Research Fellow at International Centre of Insect Physiology and Ecology (ICIPE) sponsored by German Academic Exchange Service (DAAD) scholarship under African Regional Postgraduate Programme in Insect Science (ARPPIS). Responsibilities include. Provided technical support in molecular analysis of tospoviruses and their management.
- **Sep 2006- June, 2009:** Junior Research fellow at International Centre of Insect Physiology and Ecology (ICIPE). Responsibilities; characterization of root nematodes associated with tomatoes use of biochemical and molecular techniques

#### **Consultancy**

- **2016:** Assessment of pest diagnostic capacity in plant health related laboratories in Kenya. Report submitted to *icipe* towards implementing rice, maize and chickpea IPM in East Africa, funded by the USAID.

#### **Grants and Fellowships**

- **2017 to Date:** National Research Funding (NRF); Molecular characterization of banana anthracnose -Co Investigator
- **2017 to Date:** National Research Funding (NRF); Mitigating synthetic pesticides in tomatoes production, Kenya: Co Investigator
- **2009 - 2012:** Doctoral Research Fellow: University of Nairobi/ICIPE. Research on tospoviruses diversity and management in onions and tomatoes.
- **2006-2009:** World Federation of Scientist (WFS) and Gatsby Charitable Trust. Grant to conduct research on Diversity of root knot nematodes in tomatoes for M.Sc. studies at JKUAT, Kenya.

#### **Leadership, Administration Responsibilities**

- **2017 to Date:** Postgraduate Coordinator, School of Agriculture and Biotechnology
- **2017-2018:** Curriculum Development and Review Coordinator, Crop Science (renamed Agricultural Sciences)
- **2016-2017:** Examination Coordinator, Department of Crop Science (renamed Agricultural Sciences)
- **2015-Date:** Member of several committees in the Agricultural Sciences Department and at School of Agriculture and Biotechnology
- **2013 to 2015:** Head, Molecular Lab, National Public Health Laboratories Services (NPHLS), Ministry of Health, Kenya

### **Community Engagement and other contributions**

- Find raising and lobbying for development funds to build laboratory and Class rooms (2019 FY) for Ntuti Secondary School, Meru county
- Training farmers on tospoviruses identification and managements -one of the lead trainers
- Development of Training Manuals for thrips and tospoviruses

### **Major Achievements in Science**

- Resource Mobilization: Over Ksh. 20 million in Research grants, Awards, scholarships and in kind. For example, the implementation of thrips integrated management strategies in East Africa
- Publications: Over 20 publications in referred journals and conference proceedings
- Supervision and Mentoring: Supervision of 3 PhD and 2 MSc students
- Professional and Community development: Presented research in several International and local conferences
- Administration: Member of Board of Management of Ntuti Secondary School-Meru, and member of Parent Advisory Board in several Schools (Nyeri Goodsherd Academy, Queen of Peace Academy)
- Parenting: Parenting and Mentoring children of varying ages

### **Other professional trainings**

2016: Training in Pedagogy -Karatina University, Kenya.

2014: Laboratory Safety and Biosecurity Training sponsored by National Public Health Reference Laboratories and KEMRI/CDC in August 2014

2013: Application of mass spectrometry -High Pressure Liquid Chromatography (HPLC) in detection and quantification of mycotoxins in food and plant samples at Nairobi, Kenya Bureau of Standards (KEBS) August 12-20<sup>th</sup> August 2013. Programme funded by European Union (EU)

2011: Training on Real-time PCR for detection and quantification of pathogens and insect pests at *icipe*

2009 Training on use of CLIMEX and DYMEX modelling Software Training course held at *icipe* from 14-18<sup>th</sup> December 2009

2007: Training on nematodes identification at Regional Plant Nematology Training Course held at Kenya Forestry Research Institute (KEFRI), Kenya from 16<sup>th</sup> July - 3<sup>rd</sup> August 2007

2005: St. Patrick computer college: Obtained certificate in Information technology

### **Professional bodies Membership of and University Committees**

- 2019 to date: Member, Entomological Society of Kenya
- 2018 to date: Student Mentor

### Post graduate Supervision -completed

- **2019:** Gerald Gikonyo Githinji. (M.Sc. Plant breeding). Thesis Title “Evaluation of drought tolerance in bread wheat (*Triticum aestivum* L.) using in vivo and in vitro techniques”. University of Eldoret. *Completion date-2016*
- **2021:** Lawrence Aloo Odhiambo. (M.Sc. Analytical Chemistry). Thesis Title “Determination of Mycotoxins associated with sun dried *Rastrineobola argentea* in selected Counties, Kenya. University of Nairobi. *Completion date-2021*

### Ongoing supervisions

#### PhD:

**2020:** Samuel Musa Matika PhD. Plant Pathology- Karatina University. Thesis Title “Evaluation of selected bio-control agents, induced resistance and intercropping on management of potato bacterial wilt (*ralstonia solanacearum*) in selected counties in Kenya”.

**2017:** James Kimani: PhD. Plant Pathology- Karatina University. Thesis Title “Evaluation of genetic diversity of causal pathogen of banana *anthracnose* and its management strategies in Kenya”

**2017:** Alice Gathoni: PhD. Plant Pathology- Karatina University. Thesis Title “Mitigation of toxicity linked to synthetic pesticides by use of selected plant extracts in managing insect-vectored tomato viral diseases”.

### Selected Publications in Reviewed Journals

1. **Birithia R.** Subramanian, S. Kuria, D. (2021). Farmers Knowledge of iris yellow spot disease and their preference for onion varieties: Its implications in Disease management. African Journal of Crop Science. Accepted. In press
2. Oliver Kiplagat and **Rael K. Birithia** Gerald G. Githinji, Miriam Kinyua (2019). Evaluation of drought tolerance in some Kenyan bread wheat (*Triticum Aestivum* L.) at seedling stage. Journal of contemporary agricultural practices. Vo l.1 (1; 1-8)
3. **Birithia, R.,** Subramanian, S., Muthomi, J.W. and Narla, R.D. (2018). Seasonal dynamics and alternate hosts of thrips transmitted Iris yellow spot virus in Kenya. African Journal of Crop Science. Vol. 26, No. 3, pp. 365 - 376
4. **Birithia, R.,** Subramanian, S., Muthomi, J.W. and Narla, R.D. (2018) Effects of entomopathogenic fungus and spider plant intercrop in control of onion thrips and iris yellow spot virus. International Journal of Agronomy and Agricultural Research Vol. 12, No. 6, p. 39-47.
5. Githinji, G.G., Kinyua, M. G. Kiplagat, O. and **Birithia, R.K.** (2016). Evaluation of drought tolerance in mutant Kenyan bread wheat (*Triticum aestivum* L.) using in vitro techniques. International Journal on Agronomy and Agricultural Research. 9(2), 180-189.

6. Githinji G.G., and **Birithia R.K** (2015). Effects of induced mutagenesis and single backcrossing on agronomic traits of wheat (*Triticum L.*). *Journal of Agricultural and Life Sciences*. Volume 2 (2) 31-37.
7. **Birithia, R.**, Subramanian, S., Pappu, H.R., Muthomi, J.W, Narla, R.D. (2014). Resistance to *Iris yellow spot virus* and onion thrips among onion varieties grown in Kenya. *International Journal of Tropical Insect Science* 34, 73-79
8. **Birithia, R.**, Subramanian, S., Pappu, H.R., Muthomi, J., Narla, R.D. (2013). Analysis of *Iris yellow spot virus* replication in vector and non-vector thrips. *Plant pathology* Doi 10.1111/ppa.1205.7
9. **Birithia R.**, Waceke, W., Lomo, P. and Masiga, D. (2012). Identification and distribution of Root knot nematodes in Kenya: Use of isozyme phenotypes and Restriction Fragment Length Polymorphism. *International Journal of Tropical Insect Science* 32, 78-84
10. **Birithia, R.**, Subramanian, S., Villinger, J., Muthomi, J., Narla, R.D. and Pappu, H.R. (2012) First report of *Tomato yellow ring virus* (Tospovirus, Bunyaviridae) Infecting tomatoes in Kenya. *Plant Disease* 96, 1384
11. Subramanian, S., Pappu, H.R., **Birithia, R.**, Shem, O., Muthomi, J., Sseruwagi, P. and Narla, R.D. (2011). Diversity and distribution of *Iris yellow spot virus* infecting onions in Eastern Africa. *Phytopathology* 101: S17
12. **Birithia, R.**, Subramanian, S., Pappu, H.R., Sseruwagi, P., Muthomi, J. and Narla, R.D. (2011) First report of *Iris yellow spot virus* in Onion in Kenya and Uganda. *Plant Disease* 95, 1195.

#### **Selected Publications in conference proceedings**

13. Lawrence O. Aloo, Vincent O. Madadi, Shem O. Wandiga, **Rael K. Birithia** (2020). Determination of Aflatoxins and Nutritive Levels associated with *Rastrineobola Argentea* in selected localities in Kenya. (2020) The African Network for Chemical Analysis of Pesticides and her Pollutants (ANCAP)Virtual Symposium organized from Dar es Salaam, Tanzania on 22nd - 23rd December 2020.
14. **Birithia, R.K** Narla, R. D, Muthomi, J.W, Subramanian, S. (2017). *Iris yellow spot virus* in Kenya: Incidence, severity and characterization of alternate hosts. Paper presented at the 16<sup>th</sup> Horticultural Association of Kenya Workshop held at Pwani University.
15. Subramanian Sevgan, Jean Nguya Kalemba Maniania, Johnson O Nyasani, S Niassy, AM Muvea, **Rael Birithia**, Hanu Pappu, Rainer Meyhoefer, Gerald Moritz, Henry Wainright, Sunday Ekesi. (2016) Development and dissemination of thrips and tospovirus management strategies for vegetable production systems of East Africa. *International Congress of Entomology*
16. **Birithia, R.K** Narla, R. D, Muthomi, J.W, Subramanian, S. (2016). Management Strategies of Onion Thrips and *Iris Yellow Spot Virus* by use of Intercropping, Insecticide and Entomopathogenic Fungus. Paper presented at the 16<sup>th</sup> Horticultural Association of Kenya Workshop held at Chuka University.

17. Githinji, G.G., Kinyua, M.G. Kiplagat, O. and **Birithia, R.K. (2016)**. Evaluation of drought tolerance in mutant Kenyan bread wheat (*Triticum aestivum* L.) at seedling stage. Paper presented at the 16<sup>th</sup> Horticultural Association of Kenya Workshop in Chuka University.
18. Githinji, G.G., Kinyua, M.G. Kiplagat, O. and **Birithia, R.K. (2016)**. Evaluation of drought tolerance in mutant Kenyan bread wheat (*Triticum aestivum* L.) using in vitro techniques. Paper presented at the 3<sup>rd</sup> International Interdisciplinary Conference in University of Eldoret
19. Githinji, G. G. and **Birithia R.K. (2015)**. Effects of Induced Mutagenesis and Single crossing on Agronomic Traits of Wheat (*Triticum aestivum* L.,). Poster presentation at the 2<sup>nd</sup> Africa International Biotechnology and Biomedical Conference (AIBBC 2015) held at the African Population and Health Research Center (APHRC).
20. **Birithia, R.** Subramanian, S., Muthomi, J., and Narla, R. D. (2012). Resistance screening of onion cultivars to Thrips and *Iris yellow spot virus*. 24<sup>th</sup> International Congress of Entomology 17-25<sup>th</sup> August, 2012 in Daegu- Korea.
21. **Birithia, R.**, Subramanian, S., H.R. Pappu, O. Shem, J. Muthomi, P. Sseruwagi, R.D. Narla. (2012). Diversity and distribution of *Iris yellow spot virus* infecting onion in Eastern Africa. 4<sup>th</sup> Conference of the International Working Group on Legume and Vegetable Viruses (IWGLVV), May 17-20, 2011 - Antequera, Málaga, Spain
22. **Birithia, R.** Subramanian, S., Muthomi, J., and Narla, R. D. (2010) Distribution of the tospovirus *Iris yellow spot virus* infecting onions in Kenya. Tenth Horticultural Association of Kenya (HAK) Workshop on Sustainable Horticultural Production in the Tropics:
23. **Birithia R.** Wanjohi W.J, Lomo P. and Masiga D. (2010) Molecular characterization and genetic diversity Root-knot nematodes (*Meloidogyne* spp.,) associating with tomatoes in selected localities in Kenya. Tenth Horticultural Association of Kenya (HAK) Workshop on Sustainable Horticultural Production in the Tropics: