

Curriculum Vitae: Santie de Villiers

Full name Susanna Magdalena de Villiers
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Education

2000: PhD (Microbiology, Plant Biotechnology) University of Cape Town, SA
1992: MSc (Biochemistry) University of Stellenbosch, SA
1990: BSc Honours (Biochemistry) University of Stellenbosch, SA
1989: BSc (Microbiology and Biochemistry) University of Stellenbosch, SA

Summary of work experience

Since January 2013: Senior lecturer, Pwani University, Kilifi, Kenya in the Department of Chemistry and Biochemistry. This position entails teaching courses to undergraduate and MSc students on Biotechnology, Bioinformatics and related topics as well as supervising students' research projects, writing grant proposals, building research capacity and conducting my own research at this young University.

January 2011 – October 2012: Senior scientist in Biotechnology, International Crops Research Institute for the Semi-Arid Tropics - Eastern and Southern Africa (ICRISAT-ESA), based in Nairobi. I coordinated all regional Biotechnology activities on ICRISAT mandate crops, which are sorghum, millets, pigeonpea, chickpea and groundnut. This included genetic transformation, genomics and molecular marker applications in all aspects of crop improvement. In addition I led capacity building activities including co-supervision of post-graduate students (5 PhD and more than 20 MSc) as well as coordinating and teaching courses for international organizations on molecular marker applications in crop Improvement. Since 2010, I have also mentored 3 AWARD fellows – 2 BSc and currently 1 PhD.

August 2005 – January 2011: Scientist in Biotechnology, ICRISAT-ESA, Nairobi.

April 2002 - August 2005: Break in scientific career to raise children.

July 2001 - April 2002: Agricultural biotechnology consultant for the South African grain industry.

May - December 2000: Post-doctoral research fellowship at Plant Research International, Wageningen, Netherlands.

1999 - June 2001: Senior researcher, Plant Biotechnology, Roodeplaat Vegetable and Ornamental Plant Institute of the Agricultural Research Council of SA.

1990 - 1999: Researcher, Plant Biotechnology, ARC-Roodeplaat.

Research responsibilities:

At ICRISAT, I coordinated all biotechnology research in eastern and southern Africa in collaboration with national and international partners. This entailed liaising locally with NARS, universities and international institutions for access to appropriate research facilities, developing proposals, training of technical staff and scientists and supervising post-graduate students in the following activities:

- Genomics and molecular marker research, including NGS marker development and optimization, QTL mapping and trait association.
- SSR genotyping for genetic diversity analysis.

- Marker assisted selection and back-crossing for introgression of target traits such as drought tolerance and disease/pest resistance into ICRISAT mandate crops.
- Development of genetic fingerprinting techniques for cultivar identification and seed-purity testing in groundnut and pigeonpea.
- Environmental risk assessment for the future release of genetically engineered sorghum using a genotyping and population genetics approach.
- Tissue culture and genetic transformation of groundnut and pigeonpea.

Research Grants:

- BBSRC-BMGF-SCPRID (2012); co-PI "'Smart' cereals for management of stem borer pests in staple cereals in Africa" – £ 625 000 over 4 years
- Bio-Innovate (2011); co-PI "Delivering New Sorghum and Finger Millet Innovations for Food Security and Improving Livelihoods in Eastern Africa" - \$ 1 255 000 over 3 years
- USAID Feed-the-Future, Zambia (2011); co-PI "Improving groundnut farmer incomes and nutrition through innovation and technology enhancement" - \$ 5 367 000 over 5 years
- Irish Aid (2010); co-PI "Malawi Seed Industry Development", supplementary proposal - \$ 300 000 over 1 year
- Bio-Innovate (2012) Initiated and wrote the pilot project proposal for finger millet whole genome sequencing.

Collaborations, Professional expertise and Training/Teaching experience:

- Senior lecturer at Pwani University, teaching 6 modules with practical sessions per year since January 2013.
- AWARD mentor for 3 African women between 2009 and 2014
- Coordinator and co-presenter of training courses in various aspects of Molecular Marker Applications in Crop Improvement
 - o Irish Aid, October 2010
 - o BBSRC-SARID, August 2011
 - o ASARECA-ABCIC, August 2011
 - o USAID-FtF Zambia, Dec 2011
 - o CAPACITATE East Africa, May 2012
- Hosted as ICRISAT scientist at the ILRI/BecA research platform, which entailed extensive interaction and collaboration with BecA scientists.
- Member of the ILRI Institutional Biosafety Committee from 2006 to 2011.
- Informed a panel of experts on sorghum risk assessment, gene flow and biology in Africa by presenting the results of the project "Environmental Risk Assessment of Genetically Engineered Sorghum in Kenya and Mali". The results of this discussion were published by Hokanson et al. (2010) in Nature Biotechnology, 28(9):900-903.
- External evaluator for the South African National Research Foundation (NRF), which ranks all scientists in public institutions for funding allocations.
- Member of the organizing committee of the 1st All Africa Biotechnology Congress, 23 – 26 Sept 2008, Nairobi, Kenya
- Associate editor (2008 - 2012): In Vitro Cell Development Biology – Plant (Springer) and South African Journal of Botany (Elsevier)
- Three-month research fellowship at the Floral and Nursery Plants Research Unit of the United States Department of Agriculture in Beltsville, Maryland in collaboration with Dr Kathryn Kamo. Project title: "Optimisation of a transformation system for *Ornithogalum* with a PDS/1000 He commercial particle gun" (1995).
- One-month research fellowship in collaboration with Prof Jennifer Thomson at the University of Cape Town (UCT) to compare the transformation system developed at the USDA for stable transformation of *Ornithogalum* with the Taxi system of transformation, developed at UCT (1996).

- Collaborated with Prof Chris Bornman of Lund University, Sweden during a three-month UNESCO professorship at ARC-Roodeplaat to determine the possible pathways of regeneration during the transformation of *Ornithogalum*.
- Presented particle gun- and *Agrobacterium*-mediated transformation techniques during International Advanced Tissue Culture Training Courses of the UNESCO/BETCEN at ARC-Roodeplaat from 1996 to 2001.

Courses attended:

- Enhancing negotiation skills for women, September 2013, Kenya
- Genotyping-by-Sequencing training workshop, May 2013, Kenya
- Positive work-life fulfilment, May 2012, Kenya
- AWARD Women's Leadership and Management course, November 2011, Ghana

Consultancies:

- Science consultant to AWARD (African Women in Agriculture Research and Development) since Nov 2014.
- Advised parastatal bodies and industries in South Africa on various aspects of Genetically Modified Organisms (GMO's).
- Compiled an Inventory of Biotechnology for Southern Africa for IITA (2004).

Scientific publications in peer-reviewed journals

- Tadesse Yohannes, Tesfamichael Abraha, Dan Kiambi, Rolf Folkertsma, C Tom Hash, Kahi Ngugi, Eunice Mutitu, Negusse Abraha, Mussie Weldetsion, Charles Mugoya, Clet W Masiga and **Santie de Villiers** (2015) Marker-assisted introgression improves *Striga* resistance in an Eritrean farmer-preferred sorghum variety. Field Crops Research (In press)
- **Santie M de Villiers**, Vincent N Michael, Eric Manyasa, Annis N Saiyiorri and Santosh Deshpande (2015) Compilation of a reference microsatellite kit for the genetic characterisation of cultivated finger millet (*Eleusine coracana*). Electronic Journal of Biotechnology (In press)
- J Chintu, E Monyo, V Njunge, S Deshpande and **S de Villiers** (2014) Genetic diversity analysis of Malawian and other selected groundnut genotypes using SSR markers. (Submitted Plant Genetic Resources: Characterization and Utilization)
- Ncube Kanyika BTC, Lungu D, Mweetwa AM, Kaimoyo E, Njung'e VM, Monyo ES, Siambi M, He G, Prakash C, Zhao Y, **De Villiers SM** (2015) Identification of groundnut (*Arachis hypogaea*) SSR markers suitable for multiple resistance traits QTL mapping in African germplasm. Electronic Journal of Biotechnology (In press)
- Dagnachew Lule, **Santie de Villiers**, Masresha Fetene, Teshome Bogale, Tesfaye Alemu, Geleta Geremew, Getachew Gashaw and Kassahun Tesfaye (2014) Pathogenicity and yield loss assessment caused by *Magnaporthe oryzae* isolates in cultivated and wild relatives of finger millet (*Eleusine coracana*). Indian Journal of Agricultural Research 48(4):258 - 268
- Dagnachew Lule, Masresha Fetene, **Santie de Villiers** and Kassahun Tesfaye (2014). Additive Main Effects and Multiplicative Interactions (AMMI) and genotype by environment interaction (GGE) biplot analyses aid selection of high yielding and adapted finger millet varieties. Journal of Applied Biosciences 76:6291– 6303 <http://dx.doi.org/10.4314/jab.v76i1.1>
- Manyasa EO, Tongoona P, Shanahan P, Mgonja MA and **De Villiers S** (2014). Genetic diversity in East African finger millet (*Eleusine coracana* (L.) Gaertn) landraces based on SSR markers and some qualitative traits. Plant Genetic Resources: Characterization and Utilization:1–11 doi:[10.1017/S1479262114000628](https://doi.org/10.1017/S1479262114000628)
- Dagnachew Lule, **Santie de Villiers**, Tesfaye Sewalem, Mathew Dida, Masresha Fetene and Kassahun Tesfaye (2014) Diversity and Eco-geographical distribution of *Eleusine* species collected from Ethiopia. African Journal of Crop Science 22:45-58
- Theogene Niyibigira, Kahi Ngugi, **Santie de Villiers**, Dan Kiambi, Eunice Mutitu, Sarah Osama, Abigail J. Ngugi, Mohamed Abdalla, Rasha Ali, Charles Mugoya, Clet Masiga, Daphrose Gahakwa (2013) Introgressing *Striga* resistance from a mapped donor source into a Rwandan adapted sorghum variety. Journal of Renewable Agriculture 1:6-10 DOI: 10.12966/jra.04.02.2013
- Dagnachew Lule, Kassahun Tesfaye, Masresha Fetene and **Santie de Villiers** (2012) Multivariate analysis for quantitative traits in Finger Millet (*Eleusine coracana* subsp. *coracana*) population collected from eastern and southeastern Africa:

Detection for patterns of genetic diversity. International Journal of Agricultural Research 7(6):303-314.

- E. Mutegi, F. Sagnard, M. Labuschagne, L. Herselman, K. Semagn, M. Deu, B.M. Kanyenji, **S. de Villiers**, C.N. Mwongera, P.C.S Traore and D. Kiambi (2012) Local scale patterns of gene flow and genetic diversity in a crop-wild-weedy complex of sorghum (*Sorghum bicolor* (L.) Moench) under traditional agricultural field conditions in Kenya. Conservation Genetics doi:[10.1007/s10592-012-0353-y](https://doi.org/10.1007/s10592-012-0353-y).
- J. A. Okeno, E. Mutegi, **S. de Villiers**, J. D. Wolt and M. K. Misra (2012) Morphological variation in the wild-weedy complex of *Sorghum bicolor* *in situ* in western Kenya: preliminary evidence of crop-to-wild gene flow? International Journal of Plant Sciences 173(5):507-515.
- Muraya, Moses; **de Villiers, Santie**; Parzies, Heiko; Mutegi, Evans; Sagnard, Fabrice; Kanyenji, Ben; Kiambi, Dan; Geiger, Hartwig (2011) Genetic structure and diversity of wild sorghum populations (*Sorghum* spp) from different eco-geographical regions of Kenya. Theoretical and Applied Genetics doi: 10.1007/s00122-011-1608-6
- **Santie M de Villiers** and David A Hoisington (2011) The trends and future of biotechnology crops for insect pest control. African Journal of Biotechnology 10(23):4677-4681
- Moses M. Muraya, Hartwig H. Geiger, Fabrice Sagnard, **Santie de Villiers** and Heiko K. Parzies (2011) Adaptive values of wild x cultivated sorghum (*Sorghum bicolor* Moench L.) hybrids in generations F1, F2, and F3. Genetic Resources and Crop Evolution 57(2):243-253.
- Muraya Moses, Mutegi Evans, Geiger Hartwig, **de Villiers Santie**, Sagnard Fabrice, Kanyenji Ben, Kiambi Dan, Parzies Heiko (2011) Wild sorghum from different eco-geographic regions of Kenya display a mixed mating system. Theoretical and Applied Genetics 122:989–1004
- Muraya Moses, Mutegi Evans, Geiger Hartwig, **de Villiers Santie**, Sagnard Fabrice, Kanyenji Ben, Kiambi Dan, Parzies Heiko (2011) Wild sorghum from different eco-geographic regions of Kenya display a mixed mating system. Theoretical and Applied Genetics. doi: 10.1007/s00122-011-1560-5
- Moses M. Muraya, Hartwig H. Geiger, Fabrice Sagnard, **Santie de Villiers** and Heiko K. Parzies (2010). Geographical patterns of phenotypic diversity and structure of Kenyan wild sorghum populations (*Sorghum* spp) as an aid to germplasm collection and conservation strategy. Plant Genetic Resources 8:217-224.
doi:10.1017/S1479262110000225
- Mutegi E., Sagnard F., Semagn K., Deu M., Muraya M., Kanyenji B., **de Villiers S.**, Kiambi D., Herselman L. and Labuschagne M. (2010) Genetic structure and relationships within and between cultivated and wild sorghum (*Sorghum bicolor* (L.) Moench) in Kenya as revealed by microsatellite markers. Theoretical and Applied Genetics doi: 10.1007/s00122-010-1504-5
- Evans Mutegi, Fabrice Sagnard, Moses Muraya , Ben Kanyenji, Bernard Rono, Caroline Mwongera, Charles Marangu, Joseph Kamau, Heiko Parzies, **Santie de Villiers**, Kassa Semagn, Pierre Sibiry Traoré and Maryke Labuschagne (2010). Ecogeographical distribution of wild, weedy and cultivated *Sorghum bicolor* in Kenya: Implications for conservation and crop-to-wild gene flow. Genetic Resource and Crop Evolution 57:243-253
- Susan Muthoni Maina, Quinata Emongor, Kiran K. Sharma, Simon T. Gichuki, Moses Gathaara and **Santie M. de Villiers** (2010) Surface sterilant effect on the regeneration efficiency from cotyledon explants of groundnut (*Arachis hypogea* L.) varieties adapted to eastern and southern Africa. African Journal of Biotechnology 9(20):2866-2871
- **Santie de Villiers**, Quinata Emongor, Rosemary Njeri, Eastonce Gwata, David Hoisington, Irene Njagi, Said Silim and Kiran Sharma (2008) Evaluation of the shoot regeneration response in tissue culture of pigeonpea (*Cajanus cajan* [L.] Millsp.) varieties adapted to eastern and southern Africa. African Journal of Biotechnology Vol. 7 (5), pp. 587-590

- **Santie M. de Villiers**, Susan Muthoni Maina, Timothy Taity Changa, Quinata Emongor, Irene Njagi, Jesse Machuka, Moses PH Gathaara (2008) Genetic engineering at ICRISAT and its relevance to Africa, with special focus on pigeonpea and groundnut. Proceedings: 1st All Africa Biotechnology Congress, 23 – 26 Sept 2008, Nairobi, Kenya.
- **De Villiers SM**, Kamo K, Thomson JA, Bornman CH and Berger DK (2000) Biolistic transformation of chinchinchee (*Ornithogalum*) and regeneration of transgenic plants *Physiol. Plant.* **109**(4):450-455.
- **De Villiers SM** and Bornman CH (1999) Regeneration pathways of *Ornithogalum* cultured *in vitro*. *J. S. Afr. Soc. Hort. Sci.* **9**(2):43-48.
- **De Villiers SM** (1999) Microprojectile-mediated transformation of *Ornithogalum thyrsoides* Hybrid A2. PhD thesis, University of Cape Town, South Africa.

Other publications:

- Masiga CW, Mugoya C, Ali R, Mohamed A, Osama S, Ngugi A, Kiambi D, **De Villiers S**, Ngugi K, Niyibigira T, Tesfamichel A, Machuka J, Oduor R, Runo S, Adam R, Matheka J, Bedada L, Seth M, Kuria E, Ndirigwe J, Ndolo P, Muthamia Z, Nasona B, Ntimpirangeza M, Tsegaye E, Desterio N, Ogero K, Mburugu G, Mukasa S, Kim D-J, Ferguson M, Mneney E, Nsubuga E, Rishurimuhirwa T, Byamugisha D, Wamatsembe I, Nzuki I, Mkamilo G, Kimata B and Ketema, Seyfu (2014). Enhanced Utilization of Biotechnology Research and Development Innovations in Eastern and Central Africa for Agro-ecological Intensification. In: Challenges and Opportunities for Agricultural Intensification of the Humid Highland Systems of Sub-Saharan Africa. Vanlauwe B, van Asten P and Blomme G (Editors). Springer International Publishing, pp. 97-104; ISBN: 978-3-319-07661-4; DOI 10.1007/978-3-319-07662-1_8; URL: http://dx.doi.org/10.1007/978-3-319-07662-1_8
- **Santie de Villiers** (2012) Bt crops advance. Cover story - Chemistry and Industry Magazine. Issue 5. (<http://www.soci.org/Chemistry-and-Industry/Cnl-Data/2012/5>)
- **De Villiers SM** and Ferguson ME (2004). Inventory of Agricultural Biotechnology for Southern Africa Compiled by IITA for USAID Regional Centre for Southern Africa pp80.

Invited presentations:

- **Santie de Villiers**, Kassahun Tesfaye, Emmarold Mneney, Mathews Dida, Patrick Okori, Vincent Njunge, Annis Saiyiorri, Santosh Deshpande, Katrien Devos, Davis Gimode, Dagnachew Lule, Isaac Dramadri, Ismail Mohamed and Damaris Odeny (2013) Genetic diversity assessment of east African finger millet and cost-effective development of new SSR markers. Bio-Innovate Regional Scientific Conference, 25-27 February, 2013, Addis Ababa, Ethiopia
- **Santie de Villiers** (2011) Current technologies for insect resistance in Biotech crops. CropWorld Global 2011 International Conference, 31 October – 2 November 2011, London, UK.
- **Santie de Villiers** (2011) Marker Assisted introgression of Staygreen drought tolerance QTLs into sorghum farmer preferred varieties in Ethiopia and Kenya. ASARECA Eastern and Central African Workshop on *Striga* Resistance and Drought Tolerance in Sorghum, 19 – 20 September 2011, Nairobi, Kenya.
- **Santie de Villiers** (2011) Biotechnology tools for crop improvement – what is available and how does it benefit Africa, now and in the future? Plenary lecture, International Conference on Agricultural Biotechnology in Africa: Fostering Innovation, 13-14 May 2011, Addis Ababa, Ethiopia.
- **Santie de Villiers, Kassa Semagn and Morag Ferguson** (2010) Molecular marker approaches for crop improvement supported by the BecA-ILRI Hub. Plenary lecture, Biosciences eastern and central Africa ILRI/BecA Hub launch, 4 November 2010, Nairobi, Kenya.
- **Santie de Villiers and Fabrice Sagnard** (2008) BBI project on Environmental risk assessment of Genetically Engineered Sorghum in Mali and Kenya. Presentation made to an expert panel to assess the environmental risks associated with gene flow

to wild relatives in the specific case of Africa Biofortified Sorghum (ABS), 3-6 October 2008, St Louis, USA

- **Santie de Villiers and Dave Hoisington** (2008) The trend and future of biotech crops and insect pest control. Plenary lecture, "Consolidating Experiences from IRMA I and II: Achievements, Lessons and Prospects": IRMA Project End-of-Phase II Workshop, 27-30 October 2008, Nairobi, Kenya. African Journal of Biotechnology