

W-6 TAC ANNUAL REPORT FOR CALENDAR YEAR 2016

USDA ARS National Clonal Germplasm Repository

33447 Peoria Road, Corvallis, OR 97333-2521

Phone: 541.738.4200 FAX: 541.738.4205

Kim.Hummer@ars.usda.gov

<https://www.ars.usda.gov/pacific-west-area/corvallis-or/national-clonal-germplasm-repository/>

National Clonal Germplasm Repository Staff

Permanent & Term Federal Staff

Nahla Bassil, Geneticist – Plants
Jill Bushakra, Rubus/Ribes Manager
Jack Brennan, Ag Science Research Tech.
Jeanine DeNoma, Bio. Science Tech., TC
Missy Fix, Bio. Science Tech., Distribution
Barb Gilmore, Ag Science Tech/Field Manager
Kim Hummer, Research Leader/Curator
Kyle Nemes, Program Support Assistant
April Nyberg, Bio. Science Tech., Genetics
Jim Oliphant, Bio. Science Tech., GH Manager
Joseph Postman, Plant Pathologist/Curator
Samantha Tochen, Ag Sci. Tech/Field Manager
Jason Zurn, Research Associate, Genetics



Jill Bushakra guides students from the Oregon School for the Deaf to tour Corvallis ARS research units on March 26, 2016.

Temporary Staff & Students

James Dolciamore, GH Pathways Student
Barbara Fick, GH Bio. Sci. Tech
Lilian Gharib, Work Study
Spencer Gilbride, IT Pathways Student
Sunny Greene, GH Bio. Sci. Tech
Debra Hawkes, Bio. Science Aid,
Greenhouse
Garren LaRoux, GH Bio. Sci. Tech
Christina Mulch, Bio. Sci. Tech
Gwen Moulton, GH Bio. Sci. Tech
Angelina Nachorniy, Bio. Science Tech
Jane Olson, Bio. Science Tech,
Greenhouse
Kasey Schaefer, Bio. Sci. Aid/Molecular
Tyler Young, BENCO

Graduate Students & Visiting Scientists

Meleksen Akin, GRA, OSU, Hort., Turkey
Katie Armes Carter, GRA, OSU, Hort.
Weijian Cai, China
Brooke Getty, GRA, OSU
Kien Nguyen Van, Vietnam
Tran Thi Thu Hoai, Vietnam

Stakeholder/Service Accomplishments

- 12,347 accessions, 66 genera and 774 taxa of 672 species of temperate fruit, nut, and specialty crops were conserved.
- Obtained a total of 128 new accessions and 523 new inventory items in CY 2016.
- Received 969 order requests and shipped a 4412 items in CY 2016.
- Collaborated with NGRPL, Ft. Collins, CO, on cryopreservation protocols of dormant blueberry, hazelnut, pear, currant and gooseberry.
- Collaborated with staff of NCGR-Davis to backup genetic resources of hazelnuts in Parlier, and butternuts and kiwifruit in Corvallis, Oregon.
- Trained visiting scientists from China.
- Participated on Governing Board for USDA National Clean Plant Network.
- Participated as Science Editor of the ISHS Proceedings and Journals.
- Provided tissue culture assistance to hop breeders for a hop mutation breeding project.
- Produced plants from pear, hazelnut, and strawberry accessions from heat-treated meristems for virus elimination.
- Collaborated with Forest Service scientists and USDA botanist and geneticist on in situ conservation of cranberry within National Forests of eastern US.

Research Accomplishments

- Determined the northern limits and distribution of *Fragaria cascadiensis* in Oregon.
- Observed enneaploid (9x) hybrids where *F. cascadiensis* is sympatric with *F. virginiana* ssp. *platypetala*
- Determined the volatile organic compounds in *Fragaria cascadiensis*, *Fragaria vesca* ssp. *bracteata*, and *F. virginiana* ssp. *platypetala*. *F. cascadiensis* had additional VOC not found in the other two species.
- Determined susceptibility/resistance to spotted wing drosophila in *Vaccinium* species fruit
- Determined resistance of *Vaccinium* species to Blueberry shock virus.
- Determined blooming tendencies for *Fragaria* species in containers in Corvallis, Oregon.
- Developed a multiplexed 14-SSR fingerprinting set as a tool for quick and economic identity verification for hazelnut.
- Identified the most predictive DNA test (among those available) for remontancy in strawberry accessions that are descendants from the *F. virginiana* subsp *glauca* accession from Wasatch Mountains of Utah.
- Implemented a multiplexed test for detecting the volatile compounds, gamma decalactone and mesifurane, in strawberry fruit.

Administrative Overview

Staffing Changes

In the spring of 2016, we were able to hire **Samantha Tochen** as field manager to replace the Joe Snead position. She provided excellent help for not quite a year, and resigned in February 2017 to take a job in industry. We hired **Barbara Gilmore** to fill the field manager position, and to focus her efforts on tree and nut crop collections. Student trainee **Jack Brennan** was converted to a permanent field technician when he graduated from Oregon State University at the end of 2016.

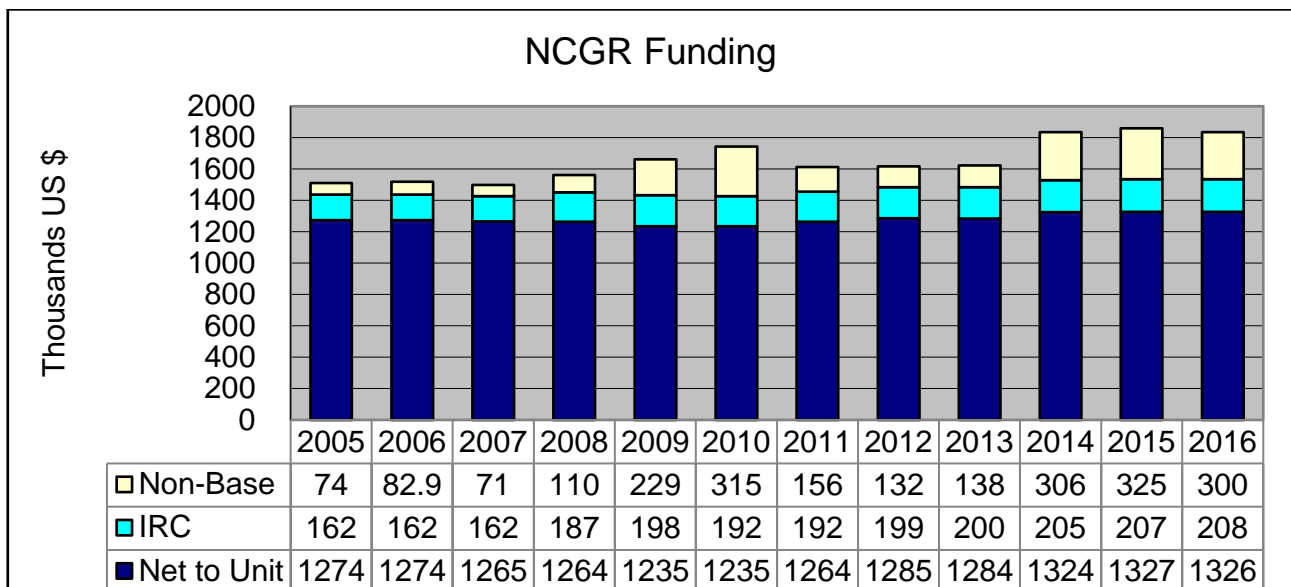
We were able to recruit for a *Rubus/Ribes* Crop Manager, and **Jill Bushakra** was selected for the position. She is working with our staff to re-propagate and invigorate the container and field collections for those genera. We welcome Barb Gilmore, Jack Brennan, and Jill Bushakra to these three new permanent positions at the NCGR.

Our location Administrative Office has new permanent employees who are assisting NCGR needs. Pete Belisle is our new Location Administrative Officer. Jeff Strang is Safety Officer, and Becky Sloop is Administrative Assistant for the Corvallis location office. John Adams was hired as a contracted IT Specialist. Stefani Morgan was selected as our location Financial Technician. Other positions remain vacant due to the federal hiring freeze.

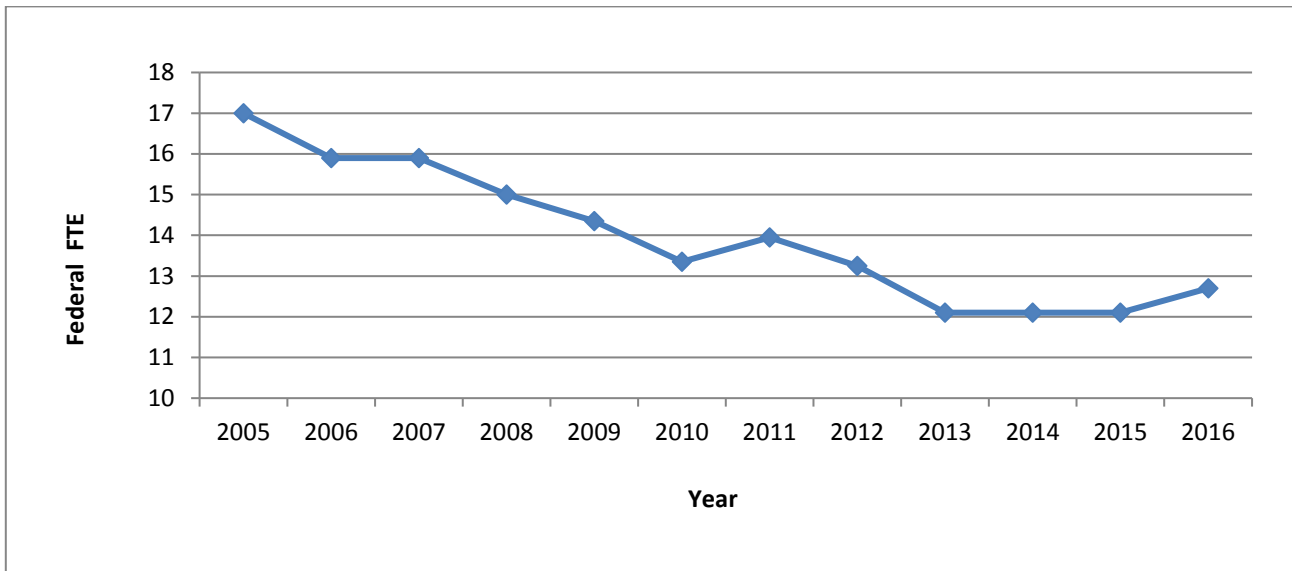
Budget

The FY 2016 and FY 2017 year remained level. Our total federal budget is about \$1.54 million.

Budget History

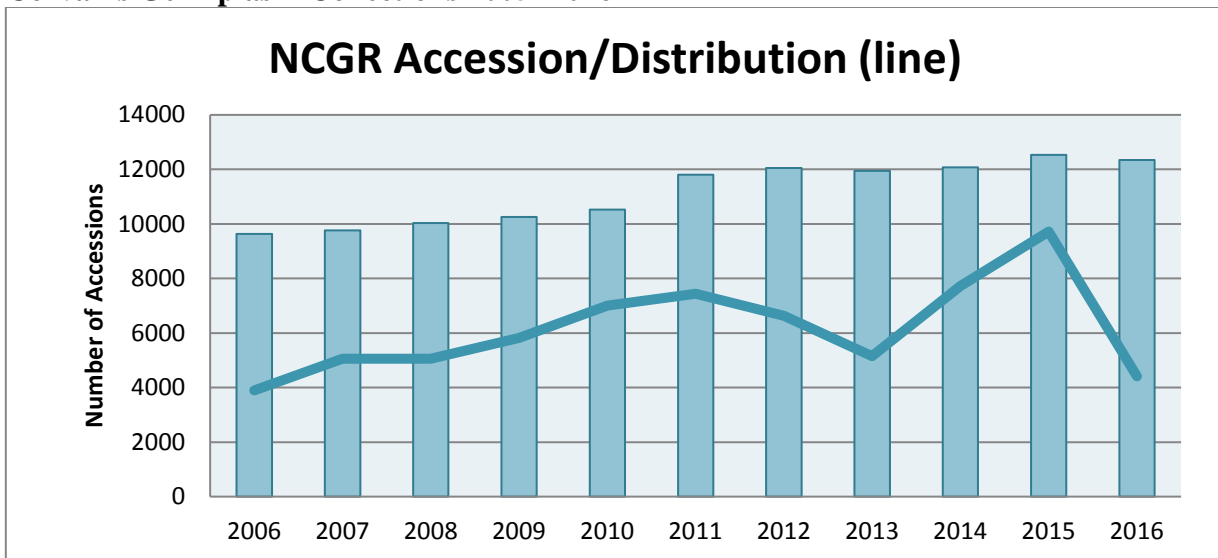


Employees History



Germplasm Collections

Corvallis Germplasm Collections 2005 -2016

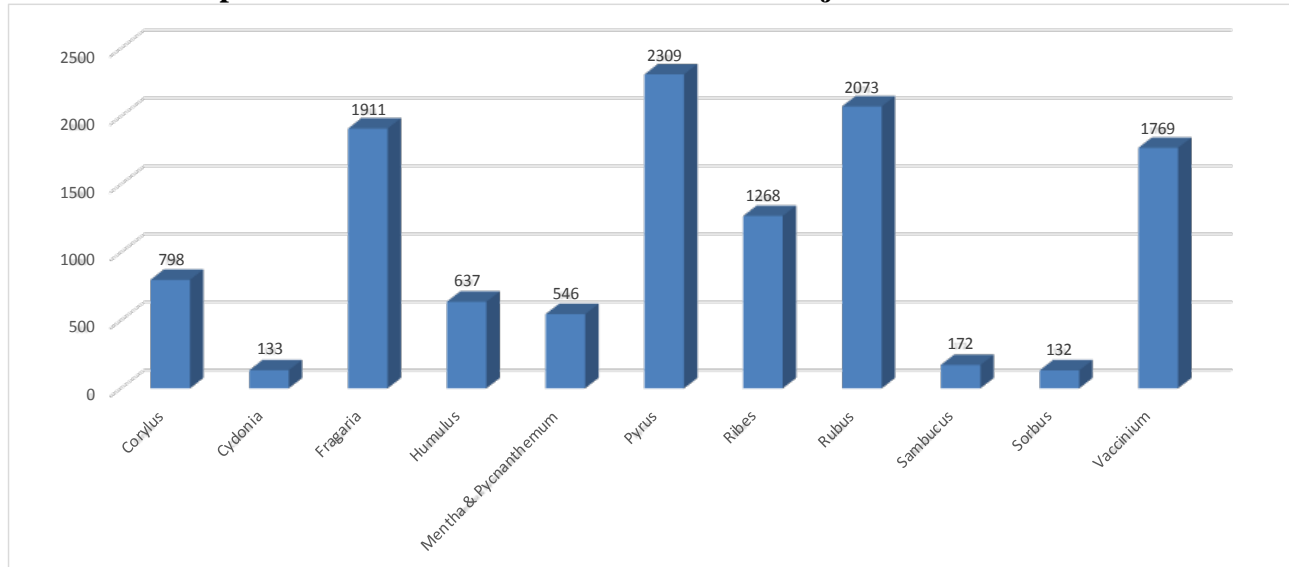


Bars represent number of accessions in the NCGR Collection. Line represents number of accessions distributed. In 2016, due to a report of *Xylella fastidiosa* we did not distribute dormant pears or elderberries which reduced our distribution counts for the year.

Corvallis Germplasm Collections – Total seed and plant accessions by genus, June 2017.

Genus	Common Name	Accessions	Genus	Common Name	Accessions
<i>Actinidia</i>	Hardy Kiwifruit	4	<i>Kalmia</i>	Mountain Laurel	1
<i>Agapetes</i>	Blueberry relative	18	<i>Lonicera</i>	Blue honeysuckle	82
<i>Amelanchier</i>	Serviceberry	48	<i>Lycium</i>	Wolfberry	14
<i>Amelasorbus</i>	Inter-generic hybrid	1	<i>Macleania</i>	Blueberry relative	5
<i>Arbutus</i>	Strawberry Tree	3	<i>Malus</i>	Apple	10
<i>Aronia</i>	Aroniaberry	9	<i>Mentha</i>	Mint	451
<i>Asimina</i>	Pawpaw	8	<i>Mespilus</i>	Medlar	62
<i>Buxus</i>	Boxwood	1	<i>Micromeria</i>	Blueberry relative	1
<i>Camellia</i>	Tea Camelia	1	<i>Peraphyllum</i>	Crab apple	7
<i>Castanea</i>	Chestnut	3	<i>Pernettya</i>	Blueberry relative	1
<i>Cavendishia</i>	Blueberry relative	5	<i>Physocarpus</i>	Ninebark	1
<i>Ceanothus</i>	Ceanothus	38	<i>Potentilla</i>	Quinquefoil	8
<i>Celtis</i>	Hackberry	1	<i>Psammisia</i>	Blueberry relative	1
<i>Chaenomeles</i>	Asian quince	47	<i>Pseudocydonia</i>	Asian quince	4
<i>Cornus</i>	Cornelian Cherry	1	<i>Pycnanthemum</i>	Mountain mint	95
<i>Corylus</i>	Hazelnut	798	<i>Pyracomeles</i>	Inter-generic hybrid	1
<i>Crataegomespilus</i>	Inter-generic hybrid	3	<i>Pyronia</i>	Pear-Quince hybrid	7
<i>Crataegosorbus</i>	Inter-generic hybrid	1	<i>Pyrus</i>	Pear	2309
<i>Crataegus</i>	Hawthorn	28	<i>Rhododendron</i>	Rhododendron	6
<i>Crataemespilus</i>	Inter-generic hybrid	1	<i>Rhodomyrtus</i>	Rose Myrtle	1
<i>Cydonia</i>	Quince	133	<i>Ribes</i>	Currant/Gooseberry	1268
<i>Dimorphantha</i>	Blueberry relative	3	<i>Rubus</i>	Black/Raspberry	2073
<i>Docynia</i>	Asian quince	1	<i>Sambucus</i>	Elderberry	172
<i>Empetrum</i>	Crow berry	17	<i>Schisandra</i>	Magnoliavine	10
<i>Epigaea</i>	Blueberry relative	1	<i>Sibbaldia</i>	Strawberry relative	2
<i>Fagus</i>	Beech	2	<i>Sorbaria</i>	False spiraea	1
<i>Fragaria</i>	Strawberry	1911	<i>Sorbaronia</i>	Inter-generic hybrid	7
<i>Gaultheria</i>	Blueberry relative	34	<i>Sorbocotoneaster</i>	Inter-generic hybrid	3
<i>Gaylussacia</i>	Huckleberry	15	<i>Sorbopyrus</i>	Sorbus-Pyrus hybrid	11
<i>Hippophae</i>	Sea buckthorn	1	<i>Sorbus</i>	Mountain ash	132
<i>Holodiscus</i>	Beauty Bush	3	<i>Symphysia</i>	Blueberry relative	2
<i>Humulus</i>	Hop	631	<i>Vaccinium</i>	Blueberry	1769
<i>Juglans</i>	Butternut	28	<i>Zelkova</i>	Zelkova	1

Corvallis Germplasm Collections – Accession counts for major collections*



* combined seed and plant accessions

Publications (since January 2016)

Alderman, S.C., Martin, R.C., **Gilmore, B.S.**, Martin, R.R., Hoffman, G.D., Sullivan, C.S., Anderson, N.P. 2016. First report of cocksfoot mottle virus infecting *Dactylis glomerata* in Oregon and the United States. *Plant Disease* 100(5):1030.

Bassil, N. V., K. E. Hummer and C. E. Finn. 2017. Lessons learned from DNA-based tool development and use in a genebank. *Acta Hort.* 1156:25-36.

Bassil, N.V., Nyberg, A.M., Finn, C.E., Clark, J.R., Peace, C., Iezzoni, A. 2016. Development of a multiplexed fingerprinting set in blackberry. *Acta Hort.* 1133:89-96.

Bradish, C.M., Fernandez, G., **Bushakra, J., Bassil, N.V.**, Finn, C.E., Dossett, M. 2016. Evaluations of sustained vigor and winter hardiness of black raspberry (*Rubus occidentalis*) grown in the Southeastern U.S. *Acta Hort.* 1133:129-134.

Bradish, C.M., Fernandez, G.E., Dossett, M., **Bushakra, J., Bassil, N.V.**, Finn, C.E. 2016. Genotyping and phenotyping heat tolerance in black raspberry (*Rubus occidentalis* L.). *Acta Hort.* 1127:321-324.

Bradish, C.M., Overbaugh, E., Ballington, J., Fernandez, G.E., **Bassil, N.V.** 2016. Comparative diversity analysis of southeastern *Rubus* germplasm through molecular and pedigree techniques. *Acta Hort.* 1127:157-162.

Bushakra, J., C. Bradish, C. Weber, J. Scheerens, L. Robbins, M. Dossett, M. Peterson, G. Fernandez, S. Serce, **N. Bassil**, and C. Finn. 2016. Toward understanding genotype x environment interactions in black raspberry (*Rubus occidentalis* L.). *Acta Hort.* 1117:25-30.

Bushakra, J., N. V. Bassil, D. Bryant, M. Dossett, S. Filichkin, C. E. Finn, T. Mockler, K. Vining, and G. E. Weiland. 2016. Comparative RNA-seq for the investigation of tolerance to *Verticillium* wilt in black raspberry. *Acta Hort.* 1133:103-114.

Denoyes, B., Amaya, I., Liston, A., Tennesen, J., Ashman, T., Whitaker, V., Hytönen, T., Van De Weg, ., Osorio, S., Folta, K., Slovin, J.P., Harrison, R., Monfort, A., **Bassil, N.V.** 2017. Genomics tools available for unravelling mechanisms underlying agronomical traits in strawberry with more to come. *Acta Hort.* 1156:13-24.

Gilmore, B.S., Alderman, S.C., Knaus, B.J., **Bassil, N.V.**, Martin, R.C., Dombrowski, J.E., Dung, J. 2016. SSR markers that identify *Claviceps* species and strains. *Fungal Biology and Biotechnology.* 3:1.

Hancock, J.F., Sooriyapathirana, S., **Bassil, N.V.**, Stegmeir, T., Cai, L., Finn, C.E., Van De Weg, E., Weebadde, C. 2016. Public availability of a genotyped, segregating population may foster marker

- assisted breeding (MAB) and quantitative trait loci (QTL) discovery: An example using strawberry. *Frontiers in Plant Science*. 7(619):1-4.
- Ho, T., Keller, K.E., **Postman, J.D.**, Martin, R.R., Tzanetakis, I.E. 2016. Evidence of sympatric speciation of elderberry carlaviruses. *Virus Research*. 215:72-75.
- Hoai, T.T.T., **Hummer, K.** and Nghi, L.T. 2017. Plant resources center and the Vietnamese genebank system. *Acta Hort.* (in press).
- Hummer, K.** and **J. Oliphant.** 2017. Agapetes: Jewels of the Himalayas. *Acta Hort.* (in press).
- Hummer, K., J. Oliphant** and **N. Bassil.** 2017. Flowering Tendencies in Strawberry Species in the USDA Collection. *Acta Hort.* (in press).
- Hummer, K.E.** and Davis, T.M. 2017. Seeking the northern boundary of the Cascade strawberry. *Acta Hort.* 1156:111-116.
- Hummer, K.E.** and **J. Oliphant.** 2017. Wild Vietnamese relatives of blueberries. *Acta Hort.* (in press).
- Hummer, K.E., Bassil, N.V.,** Alice, L. 2016. Rubus ploidy assessment. *Acta Hort.* 1133:81-88.
- Hummer, K.E., Bassil, N.V.,** Alice, L. 2017. Small genomes in tetraploid Rubus l. (Rosaceae) from New Zealand and southern South America. *J. of American Pomological Society* 7(1):2-7.
- Hummer, K.E., Bassil, N.V.,** Rodriguez, A., Olmstead, J.W. 2016. *Vaccinium* species ploidy assessment. *Acta Hort.* 1101:199-204.
- Mathey, M. Mookerjee, M., Mahoney, L. L., Gündüz, K., Rosyara, U., Hancock, J. F., Stewart, P. J., Whitaker, V. M., **Bassil, N. V.,** Davis, T. M., & Finn, C. E. 2017. Genotype by environment interactions and combining ability for strawberry families grown in diverse environments. *Euphytica* 213(5):112.
- Mccallum, S., Graham, J., Jorgensen, L., Rowland, L.J., **Bassil, N.V.,** Hancock, J.F., Wheeler, E., Vining, K., Poland, J., Olmstead, J.W., Buck, E., Wiedow, C., Jackson, E., Brown, A., Hackett, C.A. 2016. Construction of a SNP and SSR linkage map in autotetraploid blueberry using genotyping by sequencing. *Molecular Breeding*. 36:41.
- Meleksen Akin, **April Nyberg, Joseph Postman,** Shawn Mehlenbacher and **Nahla V. Bassil.** 2016. A multiplexed microsatellite fingerprinting set for hazelnut cultivar identification. *European Journal of Horticultural Science* 81:327-338.
- Perkins-Veazie, P., Ma, G., Fernandez, G., Bradish, C.M., **Bushakra, J., Bassil, N.V.,** Weber, C.A., Scheerens, J.C. 2016. Black raspberry fruit composition over two years from seedling populations grown at four U.S. geographic locations. *Acta Hort.* 1133:335-338.
- Postman, J.D. and K.E. Hummer.** 2017. Perry: American renaissance of an ancient beverage. *Acta Hort.* (in press).
- Reed, B.M. and **DeNoma, J.** 2016. Medium-term in vitro storage of pear as a complementary germplasm preservation technique. *Acta Hort.* 1113:251-256.
- Reed, B.M., **De Noma, J.S.,** Wada, S., Niedz, R.P. 2016. Determining optimum in vitro mineral nutrition for diverse pear germplasm using response surface methodology. *Acta Hort.* 1113:79-84.
- Roach, J., Verma, S., Peres, N., Jamieson, A., Van De Weg, E., Bink, M.C., **Bassil, N.V.,** Lee, S., Whitaker, V. 2016. FaRXf1: a locus conferring resistance to angular leaf spot caused by *Xanthomonas fragariae* in octoploid strawberry. *Theoretical and Applied Genetics*. 129(6):1191-1201.
- Thekke-Veetil, T., T. Ho, **J.D. Postman** and I.E. Tzanetakis. 2017. Characterization and detection of a novel ideovirus infecting black currant. *European Journal of Plant Pathology* (in press).
- Ulrich, D., Olbricht, K., Weiß, K. and **Hummer, K.E.** 2017. *Fragaria cascadiensis* K.E. Hummer: first investigation of volatile organic compounds of fruit. *Acta Hort.* 1156:679-682.
- Vanburen, R., Bryant, D., **Bushakra, J.,** Vining, K.J., Edger, P.P., Rowley, E.R., Priest, H.D., Michael, T.P., Lyons, E., Filichkin, S., Dossett, M., Finn, C.E., **Bassil, N.V.,** Mockler, T.C. 2016. The genome of black raspberry (*Rubus occidentalis*). *Plant Journal*. 87(6):535-47.
- Verma, S., **Bassil, N.V.,** Van De Weg, E., Harrison, R., Monfort, A., Amaya, I., Denoyes, B., Mahoney, L., Davis, T., Fan, Z., Knapp, S., Whitaker, V. 2017. Development and evaluation of the Axiom® IStraw35 384HT array for the allo-octoploid cultivated strawberry *Fragaria ×ananassa*. *Acta Hort.* 1156:75-82.