

# Community Breeders' Page

## Deliverables of the RosBREED project for U.S Rosaceae breeders: Part one

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deliverable [dih-liv-er-uh-buh ]:

A tangible or intangible object produced as a result of a project that is intended to be delivered to a customer

– [www.dictionary.com](http://www.dictionary.com), [www.wikipedia.com](http://www.wikipedia.com)

We're into the final stretch now for the RosBREED project, so it's time to deliver! Breeders are our primary stakeholders, and RosBREED's efforts are designed for your benefit. Although our ongoing progress is reported to our federal agency (National Institute of Food and Agriculture), to our enthusiastic Advisory Panels, to the scientific community through technical journal manuscripts, and to rosaceous crop industries, RosBREED will succeed only if breeders find our work useful enough to engage and apply in their own programs.

In recent decades, genomics and molecular genetics have promised to influence, **impact**, **REVOLUTIONIZE** horticultural breeding. RosBREED is the latest and largest research endeavor to attempt to enable marker-assisted breeding capacity for U.S. Rosaceae, taking advantage of huge advances in fundamental genomics resources that preceded it and that continue apace. Now, we must deliver.

This article begins a two-part focus on deliverables to U.S. Rosaceae breeders. While just a few examples are provided below to set the scene, just you wait till Part Two in May! Finally, in August 2013's article, the focus will shift to *Impacts*.

### Deliverables

We've placed the various types of MAB-enabling deliverables from RosBREED into the categories of Knowledge, Tools, and Germplasm.

**Knowledge:** This category of deliverable is the most intangible yet probably the most profound ("teach a man how to fish..."). RosBREED's knowledge-based deliverables include expanded **professional networks**, understanding of useful **concepts** and removal of action-limiting misconceptions, new breeding **strategies**, new **protocols**, information on **plant identity**, **socio-economic information** about the value of traits, information on **trait genetics**, **pedigree** information, information on **genetic potential** of breeding germplasm, and **experience** using DNA markers in breeding programs.

**Tools:** This category includes more tangible kinds of deliverables: **DNA tests** (what we like to call "polished jewels") and **software** (to assist with complex analytical processes, helping to sift out valuable nuggets from the ore). Both are designed to make routine breeding efforts more efficient, accurate, and predictable, as well as to support your creativity by providing unprecedented access to jewels in the genome and jewels in the germplasm.

**Germplasm:** This is the most tangible group of deliverables: the material that breeders deal with every day and the product outputs that ultimately determine the success of breeding efforts. RosBREED's germplasm deliverables include access to new **gene pools**, new **parents**, new **progenies**, promising **selections**, and **cultivar releases**.

Below and in the next Newsletter we will describe specific examples of these deliverables, made available to breeding programs like yours.

#### **Deliverable #1:** Knowledge – parentage refuted and deduced for WSU C7 [coded]

**To Whom:** Kate Evans, pome fruit breeder, Washington State University

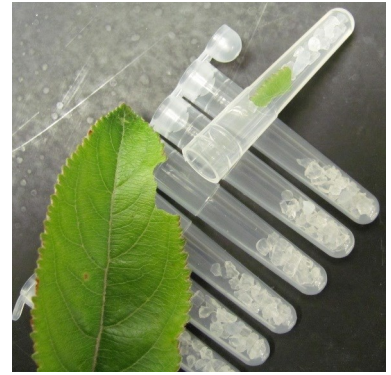
**Story:** The Washington Apple breeding Program (WABP), begun in 1994, uses scores of parents, has advanced more than a hundred numbered selections, and has generated many tens of thousands of seedlings. Controlled crosses are made, but not all pedigree records are correct, as contaminating pollen can sneak in and plant labels sometimes get mixed up. Selection WSU C7 was identified as having several excellent attributes after years of phenotypic evaluation and eventually advanced to "elite" status in 2010. But its parentage records of 'Hatsuaki' × 'Cripps Pink' were shown to be incorrect based on genotyping with two SSR markers at the Ma locus. In fact, the selection's allelic combination didn't match either recorded parent. But two alleles were a match with a specific rare haplotype (believed to partially contribute to excellent crispness, juiciness, and tartness) found in only one commonly used WABP parent and its offspring: 'Honeycrisp'. The other haplotype is a common one with many possible donors. WSU C7's parentage was updated to 'Honeycrisp' open-pollinated.

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**Deliverable #2:** Knowledge – “fresh sensation” genetic potential for new parents

**To Whom:** Kate Evans, pome fruit breeder, Washington State University

**Story:** The WABP's advanced selections are not only candidates for new cultivar releases, but also represent possible parents to help aggregate valuable alleles into the next generation of superior cultivars. Two SSRs at the Ma locus associated with “fresh sensation” traits of tartness, crispness, and juiciness were used to obtain predictive functional genotypes of WABP parent cultivars and selections. This SSR genotyping has already been used to identify several elite selections with valuable alleles to use as parents.



**Deliverable #3:** Knowledge – “fresh sensation” genotype for new cultivar, ‘WA 38’

**To Whom:** Kate Evans, pome fruit breeder, Washington State University

**Story:** The young WABP has now officially released three cultivars. The most recent, ‘WA 38’, was released in early 2012 and is currently being mass-propagated to provide commercial-scale planting material. ‘WA 38’ is exceptionally crisp and juicy all year round and has spritely tartness – a fresh sensation with every bite! This crispness and juiciness are believed to be due at least in part to a ‘Honeycrisp’ haplotype that ‘WA 38’ carries at the Ma locus inherited from its confirmed father, ‘Honeycrisp’. The expected orchard performance of this new cultivar is therefore partially predicted by DNA-based information from RosBREED – and soon the public will be able to enjoy the great taste of ‘WA 38’ while benefiting from the nutritional goodness of apples!



WA 38, photo courtesy of Bruce Barritt.

**Deliverable #4:** Tool – DNA test of “fresh sensation” for routine seedling screening

**To Whom:** Kate Evans, pome fruit breeder, Washington State University

**Story:** An SSR-based DNA test targeting the Ma locus helps predict trait levels for tartness, crispness, and juiciness. Prior to RosBREED, this was a crude tool. The test has since been refined using large-scale multi-location phenotypic evaluations conducted across three breeding programs, now in their third season, combined with SNP-based genome-scanning. The DNA test originally used two SSRs, while now we use just one. This SSR marker is easy to run and score and very cost-effective – vital features for screening thousands of WABP seedlings each year.

**Deliverable #5:** Germplasm – new families in breeding nursery with superior genetics

**To Whom:** Kate Evans, pome fruit breeder, Washington State University

**Story:** Following crossing and obtaining seed in 2011, more than 5000 germinated seedlings from seven families had their DNA extracted and were screened in 2012 with the DNA test described in Deliverable #4. The DNA-based technicalities took place in the Washington Tree Fruit Genotyping Lab in Pullman, WA. Selecting only those seedlings with superior “fresh sensation” genetics, Kate reduced the family sizes by more than half. About 2000 seedlings were then moved to a nursery where they’ll be bud grafted in 2013 and then planted in the breeding orchard in 2015. The creation and crafting of these families were therefore guided with RosBREED’s polished Ma locus DNA test.

