

Alborea (Alfalfa X *Medicago arborea*) Exhibiting Positive Effects On Yield

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Sexual hybrids of alfalfa X *M. arborea* have been produced four times since 2003; three times in our hands, and once in Australia (see the preceding report for background information and references). *Medicago arborea*-specific traits and DNA markers indicate introgression of *M. arborea* germplasm into the alfalfa genome. The hybrids are tetraploids, or near tetraploids, and have more alfalfa-specific DNA markers than *M. arborea*-specific markers. No two hybrids are the same, suggesting introgression of different blocks of *M. arborea* germplasm in different hybrids. We are still studying how hybrids are produced. Nonetheless, the introgression of *M. arborea* germplasm can be exploited while we learn more about the mechanism(s) of introgression. After all, plant breeders have been exploiting male sterility and heterosis for a hundred years, without knowing all the basics.

We are calling our new material Alborea because it is new, it is difficult to produce, it contains unique genetic material, and some stocks have more yield potential than we have ever seen in alfalfa. Moreover, we are attempting to use breeding methods that will ensure packaging and tracking the new genetic effects, rather than burying them in the genetic “deck of cards” that has been shuffled and reshuffled in northern alfalfa for many years. Alborea brings some new and identifiable cards to the table, so to speak. In fact, it looks like a new game. There will be some seed production issues, and multiple pest resistance will need to come from alfalfa parents, for the time being. Nonetheless, our view is that if crossing Alborea with alfalfa increases yield, the rest will follow.

Microplot Yield Test of Alfalfa and Alfalfa X ‘Alborea’ 2009 West Madison Farm

Forage green weight was recorded on one meter row plots of cultivars listed below (entries 1,2,3); a large-seeded alfalfa hybrid ‘E X A’ (entry 4); and hybrid ‘W’ X ‘Alborea’ (entry 5). Parent W is a large-seeded alfalfa clone, and Alborea is derived from a cross of alfalfa X *Medicago arborea* (see reports on this web site in volumes 5,7 and 9).

The test was planted June 12, 2009. Four replications were planted, but two replications were compromised by a cloud burst the last week of June. Hence, results are based on the two replications that had no apparent washing/contamination. The 08/08/09 harvest was at first flower; 09/08/09 harvest was at prebud, and 10/19/09 was frosted vegetative. Entries were cut with hand shears, and height and largest leaf data were collected every 10 cm. in each row, on respective dates. No statistics done on the data because the experiment is so small, but results were consistent over the two reps and three harvests, and the results will underpin planning.

Entry	Name	Mean Green Weight in Grams			Mean ht. Centimeters 09/05/09	Mean g. wt largest leaves 09/08/09
		08/08/09	09/08/09	10/19/09		
1	Ameristand 407 TQ	256.5	168.4	88.5	33.0	8.9
2	Legendairy 5.0	274.5	187.1	143.7	35.5	8.6
3	Rebound V	325.0	219.3	161.2	38.5	9.5
4	'E X A'	296.0	235.0	200.4	43.1	10.0
5	'W X 'Alborea'	370.5	264.0	193.0	49.2	9.8

Observations: All three commercial alfalfa cultivars have some multifoliolate leaves. Rebound looked like it would yield more than the other commercial cultivars, and it did. Rebound also was taller and the leaf sample heavier than the other two cultivars.

Yield of E X A exceeded the mean of the cultivars in both harvests, was taller, and the leaf sample heavier than all three cultivars. And, the leaves were normal trifoliolate. This is probably because we never got on the multifoliolate bandwagon, and we work mainly within our own materials.

The W X Alborea hybrid looked good, and it was good. Its height was remarkable. There was no lodging at the time of any harvest, but there was no "heavy weather", either. Its leaves were slightly smaller than those of E X A. Its yield appears associated with its height.

The harvest on 10/19/09 had been exposed to several nights of below freezing temperatures, and all entries were losing leaves, with W X Alborea having lost the most leaves. Entry number 1 looked particularly bad, but it could be the most dormant. It will be interesting to see what is alive in the spring.

A practical way to exploit some of the yield potential in entries 4 and 5 is to top cross them with elite alfalfa selections. We are going to focus on entry 5 because it has more yield potential than we have ever seen.

Meanwhile, we do not know if Alborea 5 is the best one in our toolbox. We have other Alborea clones that need to be tested, plus we have two new hybrids from work last winter. Time will tell if we can identify even better Alborea parents, and if we can "pyramid" the yield factors in Alborea.