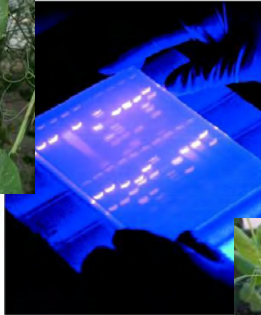


The Aragorn Story



2000



2002



2004



2007

***The Breeding
And development
Of Aragorn is a team effort***

***Plant Research (NZ) Ltd.
Lincoln, New Zealand***

***ProGene Plant Research L.L.C.
Othello, WA, USA***

In 2000 Adrian Russell of Plant Research New Zealand started the Aragorn Story and in 2009 Premier Pulse and Pulse USA bring that story to the growers of the Northern Plains. These companies bring a NEW managed program concept to the region. It is designed to take advantage of the varieties excellent edible quality and then further translate that quality into production and marketing potential. Please read on to learn the story and what it could mean for this regions dry green pea producers.

The Aragorn Story

2000



Crossing in the Greenhouse in New Zealand

Purpose – to start a new hybrid that can produce new stable varieties.

In September of 2000 Adrian Russell of Plant Research New Zealand selected varieties from his parent collection. These varieties were chosen on the basis of improved characteristics and with the goal of creating a new variety. The pollen from one (male) is moved by hand to the ovule of the second (female) which produces one pod with 1 to 6 seeds. Each seed has exactly $\frac{1}{2}$ of the male's genes and $\frac{1}{2}$ of the female genes. The cross that eventually produces Aragorn is one of 60 different crosses made in 2000.

2001

First Generation Advancement in Greenhouse in NZ - F1 to F2

Purpose – this generation we are developing genetic variations between each seed produced. Every new seed will have different genetics.

Each pod from the crosses will be planted in a separate pot in the greenhouse. Here we are increasing the seed while it segregates. In each generation the plants will have greater stability. One of the 60 pots will eventually produce Aragorn.



Second Generation Advancement & Pea Mosaic Virus screening in the Greenhouse - F2 to F3

Purpose – this generation helps to develop a higher percentage of genetic stability in the plants.

While plants are growing it also give us the opportunity to extract DNA from some leaves. The DNA is tested using molecular markers to confirm the presence of the gene that gives Pea Seed Borne Mosaic Virus resistance.



Third Generation Advancement in the Field in New Zealand - F3 to F4

Purpose – To select the first potential new varieties one plant at a time.

Each pot from the greenhouse will now get its own small ten foot plot in the field. This generation advancement is planted in the New Zealand fall (September). At this point Adrian selects single plants out of the 60 plots. Of about 400 single plant selections (SPS) one will become Aragorn. By now 75% percent of these plants selected are stable while 25% are still changing.

2002

Fourth Generation Advancement in the Field as a Plant Row in the Pacific Northwest - F4 to F5

Purpose –To select the potential varieties by choosing the best out of the best.

Each plot planted this season contains the seed from one individual plant or SPS. Out of this year's 110 plots Kurt Braunwart of ProGene will select about 300 individual plants, all of which are their own variety. One plant out of these 300 will become Aragorn.



2002 continued

Fifth Generation Advancement is planted in the field, in New Zealand as a Plant Row - F5 to F6

Purpose – To evaluate and keep only the best and stable plant rows. This reduces the number of entries for the first plot trial.

The seed from each of the reselected plants (RS) are now planted in their own plot. Each plot is evaluated for agronomic traits. Of the 300 plots about 200 will be selected for harvest. The samples are then evaluated for quality and quantity with the purpose of reducing the numbers to about 70 to 100. Aragorn survives the “cut” and is sent on to the next phase. (Inspecting what becomes Aragorn in NZ)



2003

Preliminary Yield Trial and Small Seed Increase in the Field in the PNW

Purpose – To gain more yield and agronomic comparisons to current varieties.



We select the variety that will become Aragorn in Moscow, Idaho. Kurt Braunwart of ProGene and Jerry Robinson were walking the trial plots when one variety simply “Jumped Out” because it looked so impressive agronomically. It is taking a big chance to do seed increases this early but the impression was so emphatic that ProGene “took the plunge”. 14 pounds were produced this year and sent to New Zealand for increase.

First Seed Increase in New Zealand plus Advance Replicated Yield Trial

Purpose – To increase the 14 pounds to 150 pounds.

Adrian enters the variety into the New Zealand Advanced Yield Trial for more extensive evaluation and he also plants a seed increase. The yield trial hints that our combined enthusiasm may be warranted.

2004

Palouse Replicated Advanced Yield Trial and Further Seed Increase

Purpose – to confirm our excitement about the variety. We planted 40 pounds of the 150 sent back to us and produce 600+ pounds.

The first USA Advance Yield Trial does confirm the judgment of the team to take the fast track with the new variety, Aragorn. We start showing Aragorn to customers in July when visiting the trials. After harvest we compare Aragorn’s quality to 40 other green varieties in our soaking and split quality evaluation tests. Aragorn scores very well. We start showing samples of Aragorn to customers to verify that they pick it out as superior quality the same as we did. (Mike Wood & Kurt Braunwart)



Winter Increase of Seed in New Zealand

Purpose - to increase the 600 lbs sent to New Zealand.

Adrian has an exceptional yield and sends back over 9,000 pounds from 2004.

(The PRL NZ crew with Kurt)

2005

Further Seed Increase & Continue Advanced Yield Trial and first time in University Trials. First time in joint trials with Legume Logic, ProGene and Pulse USA at Wilton, North Dakota.



Purpose – To get multiple year, multiple site and third party data to better confirm the value of the variety.

Aragorn's performance in all trials is superior. Seed increase is split between the Palouse and irrigated Columbia Basin in the Pacific Northwest. Both seed increases have excellent yield, and Aragorn is now named after the Elf King of the Lord of the Rings trilogy. Seed is pre-booked with customers in the Pacific Northwest and North Dakota for 2006 planting.

2006

Seed Increase and further comparative data work. First edible field production.

Purpose – To verify that Aragorn performs in the field as well as it did in the trials. To get sample production for the edible market to test for splitting and whole market quality.

Fields are distributed around the Pacific Northwest and North Dakota. Adrian and Kurt visit seed increase fields with customers. Field yield and quality results are very good and the variety is established. Aragorn's ability to resist bleach in a field situation is confirmed.

(Kurt Braunwart
and Adrian Russell)



2007

Further Seed Increases with Customer's Growers throughout the US



Seed produced this year will now be available on a commercial basis for customer's growers to plant in 2008. Some seed is diverted to edible product to ship larger quantities to key food buyers. This allows the team to confirm that the qualities identified by research and processors are also recognized by the buyers. By the end of 2007 the name "Aragorn" is circulating in the market.

Each year this process starts again with a new set of crosses to produce the varieties that you will be planting eight to twelve years from now. So each phase of this process is going on simultaneously but with different genetic crosses at different stages of the process. Through the efforts of everyone in the genetic development team these new and improved varieties come to the industry every year. We throw away 99.9% and only the best .1% survives for your consideration. □