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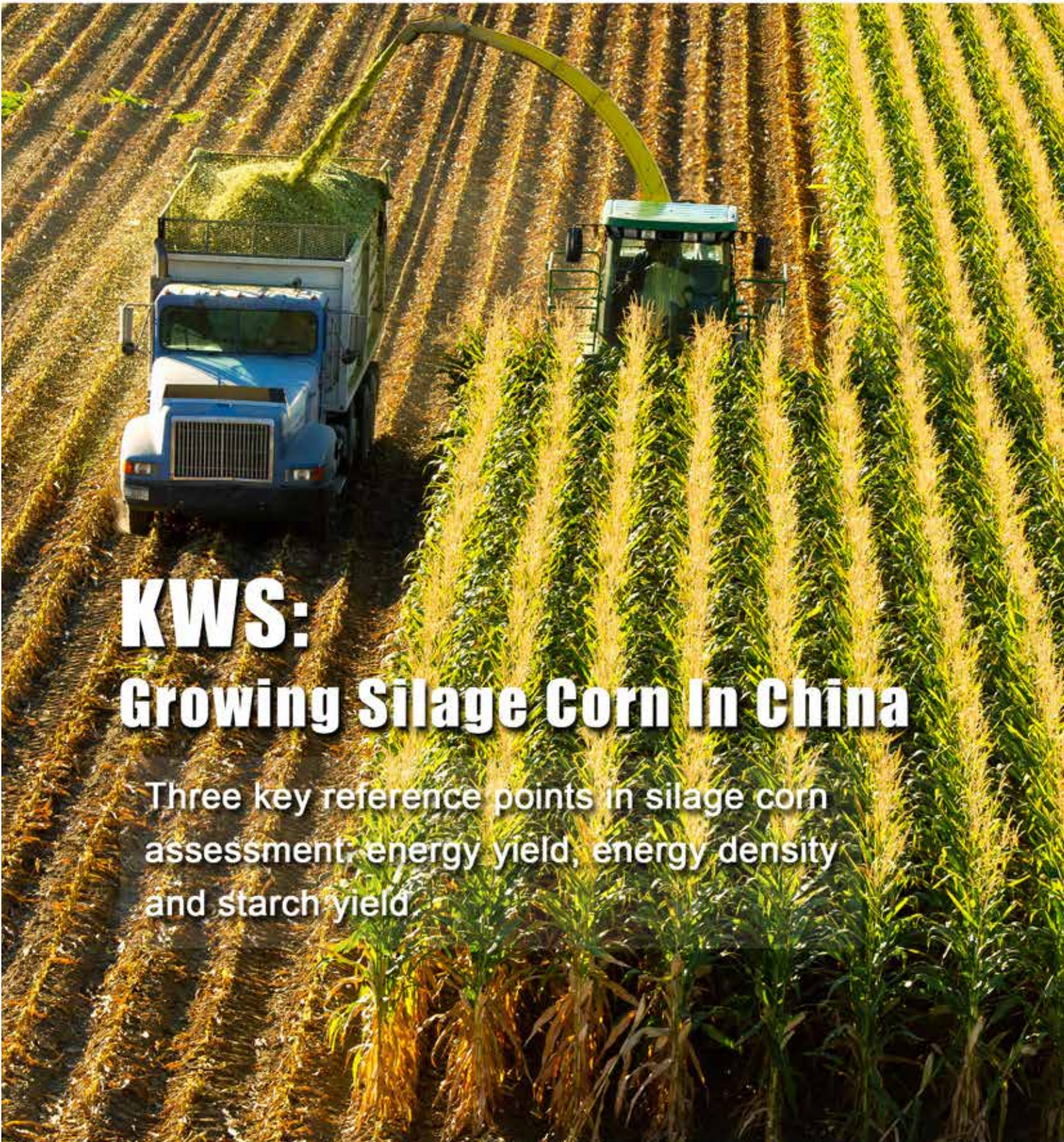


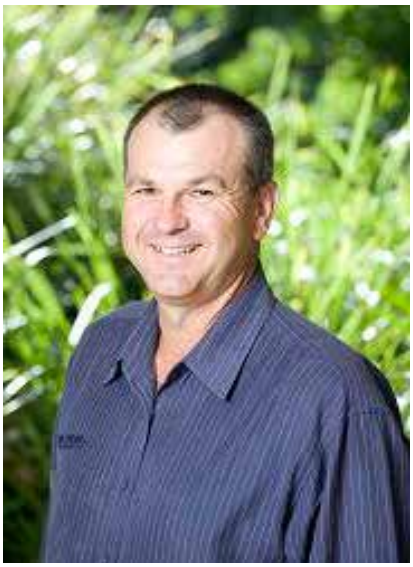
KWS: Growing Silage Corn In China

Three key reference points in silage corn assessment: energy yield, energy density and starch yield

Silage Corn in Australia

Interview with Brad Jamieson, National Sales Manager, Advanta Seeds Australia

Advanta Seeds produces and markets corn hybrids in Australia under the Pacific Seeds brand. These hybrids have been trialled and tested across a wide range of environmental conditions to provide farmers the utmost confidence in these products. The Pacific Seeds corn range has been tested for yield, grain quality, disease tolerances and agronomic performance. The product range offers hybrids for the key market segments of feed grain, processing grain and silage fodder. Additionally, a focus on imidazoline tolerant hybrids within the range offers farmers a further weed control option in their corn crops. The Pacific Seeds range of corn products are some of the best on the market for Australian conditions.



What are the main breeding trends for silage corn?

At Advanta Seeds particularly In Australia, starch is very important. So we are testing all our hybrids early for starch but we also look at things like grain yield, stover to cob ratio, disease, size of the plant and the ability to handle heat and moisture stress. Grain yield is very important as not all farmers are 100% silage so they also want the ability to harvest and sell the grain as well.

At Advanta Seeds, do you have any preference during silage corn R&D, only for feed or for both feed and food?

We have 2 types of corn in Australia grit corn for food processing (harder grain type) and soft yellow dent for silage and cattle feed. We try and release hybrids that fit all 3 categories i.e., cattle feed, silage and food processing. This is very hard to do so at the very least we produce hybrids that fit 2 of the 3 , usually cattle feed and silage work well together Pac 624 is the leading hybrid in this bracket. We do have 1 hybrid Pac 727IT that fits all 3 it can be processed as a grit corn, has really good silage potential and feed values and is also a high yielding grain hybrid.

Could you introduce us silage corn products in your company?

Pac 624 is the leading silage corn in Australia as it has really high yielding silage qualities but also hold its starch quality extremely well. It is a 118CRM corn. We have another hybrid that is new called Pac 606IT 114CRM corn that is making huge inroads into the market. It is quicker than Pac 624 but has very similar yields and starch characteristics. It also has the added benefit of the "IT" gene for weed control which the farmers like.

What kind of seed treatment products do you use for silage corn?

We "Elite" treat most of our corn in Australia with Gaucho (Bayer product) which helps with soil insects.

Outlook of the Silage Corn Industry in Australia.

We have seen some good growth in Australia in the silage market in the last few years on the back of high cattle prices and feedlots being full. We are seeing a slight downturn in Dairy in Southern Australia at the moment but with water prices lower than average most farmers are still using corn as a silage option.

Crop of the Future – Grain Sorghum

By Advanta Seeds Sorghum Team with special contribution: Andrew Short (left), Sorghum Business Manager, Advanta Seeds Australia; Benjamin Beyer (right), Ph.D. USA Sorghum Breeding Lead, Advanta Seeds North America.

Brief Market Information

Grain sorghum, the fifth-most produced grain in the world, behind wheat, corn, rice, and barley according to the Whole Grain Council, is a hardy summer grown crop which has its origins in Africa. Through international breeding efforts, sorghum has now been adapted to be grown on all continents except Antarctica. Approximately 50% of production continues to be used for human consumption with many African nations in particular continuing to use sorghum as their primary grain instead of wheat. Markets also exist for brewing and distilling sorghum into alcoholic beverages and in the production of ethanol. In addition to human consumption utilization, sorghum is also a major feed grain for the poultry, beef and pork industries.

Global production of grain sorghum has been relatively stable for many years with approximately 60 million metric tonnes produced each year. The top ten producing nations are the United States of America, Nigeria, Mexico, India, Argentina, China, Sudan, Ethiopia, Australia and Brazil. In recent years China has become the world's leading importer (and consumer) of grain sorghum as growing demand from the feed grain and distilling segments has seen their requirements surge.

Grain sorghum with its natural high stability characteristics, drought and heat tolerance as well as its nutritional values for human and animal consumption is a crop of the future that can face global warming and climate change.

Innovative breeding sorghum technologies

The key breeding technologies in grain sorghum are focused on improved yield, grain quality, heat and cold tolerance, and non-genetically modified pest and herbicide resistance. There has been a lack of new herbicides resistance and post-emergence grass weed control technologies which is one of the biggest challenges for sorghum growers. These weeds are too expensive to control with hand hoeing due to the cost of labour. Therefore it is imperative that growers have a way to control weeds after emergence. With Advanta Seeds herbicide tolerance technologies growers have another tool to maintain profitability in the crop.

When grain sorghum portfolios are analysed, the highest volume products are over 10 years. These are the good performers and stable ones. This is what makes the product portfolio renewal in grain sorghum much slower than any other higher technology crop such as soy, sunflower, corn or canola. There are many variables that impact the grain sorghum crop, but for growers standability and adaptability to various conditions that they face year on year are the important factors.

Advanta Seeds has been doing research on grain sorghum for over 50 years in cooperation with local farmers and research institutes, and constantly work on new products. Recently, Advanta Seeds created a partnership with Texas A&M AgriLife Research to open a new biotech station to develop new sorghum breeding technologies.

One of the most innovative Advanta Seeds technologies is IMI Sorghum. IMI Sorghum manages broad leaf and grass weeds in sorghum fields through impactful and residual activity of IMI herbicide traits which is more effective than any currently available herbicides solutions. IMI Sorghum handles herbicides in sorghum fields with no seed treatment needed, pre- and post-emergent treatment. With IMI Sorghum technology combined with Advanta's hybrids farmers can achieve 5% to 10% yield and could incorporate more areas to the crop.

Another Advanta Seeds innovative sorghum breeding technology is focused on producing hybrids with Sugarcane Aphid tolerance. Sugarcane Aphid (SCA) is a new pest to sorghum in North America but its presence has already made an impact. SCA feeds on sorghum during grain development and can cause

significant crop losses, reducing yields and stunting plant growth. Infestations of this pest in the field are costly to control and severe infestation can lead to lodging and subsequent harvest loss to complete crop loss. At Advanta Seeds we screened some of our germplasm and found many proprietary lines with tolerance in addition to the public lines in our collection. We have found tolerance in some of our female lines whereas other companies seem to be relying on tolerance coming from a male line. This helps with production and controlling COGS and shows the depth of the genetic diversity in the germplasm. It also allows to use these multiple sources of tolerance to stack the different genes together and provide the sorghum grower with a high and durable level of tolerance. This also means that it could be harder for the sugarcane aphid to overcome tolerance in hybrids using multiple sources of tolerance. Advanta Seeds currently offer a few sorghum hybrids with high levels of genetic tolerance to SCA, tested in field trials of Louisiana State University and Texas AgriLife.

In addition Advanta Seeds is working on various molecular and high-throughput phenotyping technologies that will allow to select the very best of lines in the breeding populations. This will allow to maximize gain for yield and to have a great agronomic package for sorghum growers.

Opportunities in emerging and expanding markets

With climate uncertainty and environmental conditions becoming more challenging, sorghum is perfectly positioned to step into the void of other crops which may become more difficult to grow. For example, reduced availability of ground water across the United States leading to less irrigation water available for traditionally grown crops such as corn. Growers in some of these affected regions begin to grow more sorghum due to its lower water requirements and high draught tolerance. Sorghum uses less water and therefore the environmental impact is much less compared with growing corn.

Expanding agricultural markets in Eastern Europe, South America and Asia offer opportunities for many crop groups including sorghum. It has been a growing market for grain sorghum especially under the stress of unpredictable weather conditions and reduced grain production. There has been growing demand for grain sorghum and farmers started to explore growing sorghum although it is a new crop and not well known yet in these regions.

Advanta's sorghum breeding programs have already developed material for these new regions. Advanta Seeds has sorghum breeding programs in Argentina, Australia, and the United States, where material for all geographies is researched.

Sorghum for human consumption - Gluten Free and High Nutritional Value

Sorghum is a naturally gluten free grain which makes it an ideal choice for including in the diet of people who may suffer from gluten intolerance or choose to consume less gluten. It also has a high nutritional value with high levels of unsaturated fats, protein, fibre, minerals and antioxidants. The high nutritional values and health benefits recommend sorghum as a replacement for rice or corn. The interest in sorghum human consumption as well as the use of it in food production increased over the years and continues to grow.

Non GMO

There are currently no genetically modified sorghum products available. Sorghum is almost the only crop with no technology (Biotech or mutagenesis) added, compared to corn, soy and canola with Biotech, and numerous crops with Imidazolinone tolerance (by mutagenesis), like sunflower, rice, wheat, canola, corn and soy.

Sorghum is able to access markets which may have become off limits to other competitor crops which have adopted genetically modified technology. In non GMO markets this can give sorghum a competitive advantage over some more widely grown crops.

Hybridisation vs OP

The adoption of grain sorghum hybrids has seen productivity increase dramatically. Despite this, significant areas of Africa and Asia in particular continue to have large open pollinated markets. There are various advantages of hybrid products over traditional open pollinated varieties to ensure good crop performance. The right hybrid for the growing region will help evaluate yield potential, ensure the health of the crop, and consistency and stability of the crop performance.

Investing in sorghum

Facing global climate changes and understanding the benefits and use of grain sorghum, there is no doubt that it is a crop of the future and worth investing and developing new technologies for as well as demonstrating to growers its yield potential. Advanta Seeds being a leader in sorghum crop has capacity to provide technology for all conditions and geographies now and in the future.