Australian Oilseed Federation

US and Canadian Soybean Industry

Research Study Visit

September 1999

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Executive Summary

Bob Colton visited the USA and southern Canada for three weeks in late July and early August 1999, with funding from the Australian Oilseeds Federation, to study aspects of the North American soybean industry. He attended the Global Soy Forum in Chicago and held talks and visited with growers, marketers and industry bodies in the St Louis, Missouri region and in southern Ontario, Canada.

Major themes at the conference were genetic modification and breeding, soybeans in human nutrition and health and new uses for soybeans. The conference provided a unique opportunity to gain an appreciation of the exciting developments and the concerns emerging from the GMO debate. It also provided an insight into the potential for expanding human consumption markets for soybeans in Australia and the western world. Many of the new industrial uses being developed for soybeans in the US have potential in Australia, but using canola as a feedstock rather than soybeans.

The sheer size of the US soybean industry, the extent of levy funds available for research, development and marketing in the public and industry sector as well as the scale of private sector breeding and variety development was an eye opener.

The industry in southern Ontario is having considerable success producing and marketing food grade soybeans into Asia and Europe. Australia's minute tonnages into Japan could be increased significantly if we had a greater range of varieties with suitable quality. Premiums paid for high quality human consumption beans would help soybeans compete with higher return crops for scarce irrigation water.

While the soybean industry will never be huge in Australia, production can be raised considerably. Biggest gains will come from expanding coastal production in the beef cattle and sugarcane regions of the east coast, mainly for the crushing market. Inland irrigation regions are best placed to produce high quality food grade beans for the growing domestic and export markets.

Improved varieties, with the right maturity, weathering tolerance, disease resistance and quality, will be necessary if this is to be achieved.

Objectives of the visit

To increase awareness of new developments in soybean R&D and to meet key industry people from thew world's major soybean producing regions. This will be achieved by attending World Soybean Research Conference VI and associated industry meetings in Chicago.

To study the production, development and marketing of soybeans for human consumption, with emphasis on quality criteria for different markets. To be achieved through discussions with and facility inspections of growers, processors and marketing boards.

Findings

World Soybean Research Conference VI

The conference was staged in Chicago from 4-7 August. It was part of a larger event -Global Soy Forum '99, which included the Midwest Soybean Conference and the Soy in Animal Nutrition Symposium, These events ran concurrently, offering a wide range of subject area choices for delegates. Close to 2000 delegates attended.

Biotechnology and plant breeding, with a major emphasis on GMOs was the major theme of the conference. Other major themes were the role of soybeans in human nutrition and alternative (industrial) uses for soybeans.

The GMO debate

About half of the US 74 million tonne soybean crop in 1999 was produced from genetically modified varieties. Almost all of these were Roundup Ready varieties. Some of these crops were inspected in Missouri and Southern Ontario and their use discussed with growers and industry bodies. Growers are very happy with the agronomic performance of these varieties. They cite more opportunity for no tilt, fewer spray passes over the paddock, cheaper, better weed control and cleaner grain samples as advantages. They are less happy about consumer reaction to GMO's in their major export markets in Europe and Japan and may slow the adoption of these varieties in order to retain market access.

In spite of an estimated 60% of processed supermarket foods in the US containing GM ingredients, 70% of US consumers are reported to be unconcerned.

The conference reported the use of gene technology to introduce many novel traits into soybeans. While initial GM varieties are providing benefits to growers, many varieties in the pipeline will carry traits of value in human and animal nutrition and to the environment.

For example: oils wilt be lower in saturates and linolenic acid and some will be monounsaturated. Some varieties will have elevated isoflavone levels which will increase human health benefits and promote leaner carcasses in pigs. Others are being modified to be sweeter and have the beany taste removed, making soy foods more appealing to western palates.

New varieties with increased lysine and methionine levels will reduce animal feeding costs. Soybeans with lower phytate will improve phosphorus metabolism in pigs and halve the amount of phosphorus in effluent.

Phytoestrogens and human health

Soybeans are a major source of phytoestrogens (plant oestrogens), in the form of isoflavones. Research has shown these compounds to provide significant health benefits to the community, particularly to post menopausal women. Although this research is ongoing the US FDA already allows health claims to be made on soybean food products.

Evidence was presented at the conference of the beneficial effects of isoflavones in blood cholesterol reduction, reducing cancer risks, maintaining bone density and as an antioxidant.

These developments are attracting considerable interest among North American consumers. with soy food sales growing at 30% per annum and many new products entering the market. This trend is already beginning in Australia and is likely to accelerate, increasing demand for light hilum soybeans and producing additional premium markets for growers.

New uses for soybean

An increasing proportion of grower levies (checkoff funds) is being directed into research on the development of new uses for soybeans in the US. In addition to new soy food uses discussed earlier some examples of new uses now being commercialised are:

- Fish feed is a major new use for soy protein as fish farming increases around the world
- Soybean adhesive extenders are replacing a portion of the petroleum-based resins used to adhere plywood layers
- New soy based finger-joint wood adhesives are just as strong as petroleum based adhesives, while reducing drying time and waste
- Emulsified soybean oil is successful in controlling mites and other pests on fruit trees and ornamentals. It has also been shown to delay bloom and thin fruit in peach orchards
- A soy based diesel fuel additive improves engine lubricity, boosts fuel efficiency, extends engine life and reduces exhaust emissions. Added at 0.2% it increases fuel cost by less than 1c/litre.
- Soy based engine lubricating oils are providing comparable performance to petroleum based oils.

While the Australian soybeans industry is too small to take advantage of many of these new uses, it is likely that most would work equally well based on canola and could have significant potential in Australia.

Research and marketing levies

Research funding, marketing and industry affairs were discussed in talks with the United Soybean Board (USB) and the American Soybean Association (ASA), both of which are based in St Louis, Missouri.

John Becherer, CEO of the United Soybean Board explained how 'check off levies are collected from growers and allocated to research and marketing by an all-grower board. Growers pay a compulsory levy of one half of one percent of the selling price of beans. This amounted to US $120 million in 1998. Funds are divided between USB and state boards. State boards spend most of their funds on production research within their state. USB funds are spent on research and marketing. Research funds go to the universities, mainly for breeding, oil and meal composition and quality research, with the technology being sold to the seed companies, who develop the varieties. Funds are also allocated to address national cost of production issues and new uses research. A portion of the USB funds are allocated to ASA who handle international and domestic marketing.

In discussions with ASA CEO Steve Censky, International Marketing Deputy Director Kirn Nill and Asia Division Director Gil Griffis the size and scale of the international and domestic marketing programs for US soybeans became clear. Annual expenditure on these programs in 1998 amounted to US $22 million of grower levies. A significant part of the international marketing effort in recent years has been directed to trying to gain acceptance of GM soybeans in Europe and Japan.

The soybean industry in Southern Ontario

Ontario produces about 2.3 million tonnes of soybeans annually, of which about 10% are light hilum, for the food trade. The majority of food grade beans are exported to Europe and Asia, with over 80,000 tonnes per annum going to Japan. Market research by the Australian Oilseeds Federation in the Japanese market has shown a clear preference for Canadian edible grade soybeans over US soybeans.

A visit to the Chatham area in southern Ontario and discussions with Kim Cooper of the Ontario Soybean Growers Marketing Board revealed a very professional approach to the production and marketing of food grade beans in this region. Light hilum beans are grown, handled and marketed under an Identity Preserved program, managed through local marketing companies, under the auspices of the OSGMB.

Although 10-20% of soybeans in Ontario are grown from Roundup Ready varieties these are all dark hilum beans for crushing. There are no light hilum varieties in North America which have been developed using genetic modification.

There are two public breeding programs, specialising in light hilum varieties for tofu and natto production in southern Ontario. The maturity range (groups 0 to 2) suited to southern Ontario appears to be similar to the maturity of soybeans grown in the Riverina and northern Victoria. Varieties from this area may provide useful parental lines for the NSW Agriculture breeding program; having high yield, suitable quality for natto or tofu and presumably, the earliness

required for the Riverina. They may not have resistance to all the races of phytophthora found in Australia and may not be adapted to our hot dry environment. However, these new sources of germ plasm, if available, could enhance the NSW Agriculture program.

Implications for the NSW and Australian industries

There are no GM soybean varieties being grown or under evaluation in Australia (as at mid September 1999). The Australian industry is quite small and is unlikely to be able to attract GM varieties from the private sector in the short term. From a market perspective there is merit in remaining GM free, at least for the next few years. However, the sooner the Federal Government's proposed public education program on GMO's begins the better, so as to encourage more rational debate on the merits and demerits of the technology, as there are obvious benefits from GMO varieties for Australia, in the longer term.

Australia is likely to remain a relatively small producer of soybeans. We do not have the natural advantages of the mid west of the USA or the Great Lakes region of southern Ontario to grow very large areas of soybeans. These regions have large areas of fertile, arable land, high, reliable summer rainfall with moderate temperatures and humidity and produce high average yields of 2.5 - 3 t/ha.

In Australia, areas with adequate summer rainfall are coastal, where suitable land is limited. Irrigation water is scarce and is increasingly going to higher value crops. Dryland summer cropping regions inland, with their lower rainfall and higher temperatures result in lower average yields and are not likely to produce large tonnages.

However, soybean production in Australia can be raised beyond the current 100,000 tonnes per annum. To achieve this we must continue to work with cane growers and beef producers to help them integrate soybeans into their farming systems. We must continue to develop improved weathering tolerant varieties adapted to coastal environments stretching from the NSW mid north coast to the Burdekin Valley in north Queensland. Coastal regions can achieve high yields but are likely to produce soybeans mainly for crushing as harvest weather will make it difficult to achieve the high quality required for the food trade.

For the inland irrigation valleys we must concentrate on breeding high quality light hilum varieties for the domestic and export food trade while improving crop management practices to raise average yields. Only with the combination of high yields and the premium prices ($50-$100/t above crushing prices) which these niche markets pay can the profitability of soybeans compete for scarce irrigation water with other high value crops.

Recommendations

1. Delay the introduction of GM varieties to Australia for a few years at least so as not to disrupt the developing markets for food grade soybeans

2. Concentrate breeding efforts for inland irrigated production on light hilum varieties suitable for tofu and natto markets

3. Liaise with southern Ontario breeders to access germplasm for southern NSW and Victoria

4. Continue efforts to:
    - establish soybeans as a potential crop in Queensland sugarcane areas
    - expand production in NSW North Coast beef cattle areas

5. Develop weathering tolerant varieties for coastal Queensland.

Appendix 1 - Itinerary

July 26-27	Travel Orange-Sydney-Tokyo-Chicago
July 28	Travel Chicago-St Louis
July 29-30	St Louis, Missouri
August 2-3	Chicago, Illinois
August 4-7	World Soybean Conference, Chicago
August 8	Travel Chicago-Chatham, Ontario
August 9-10	Chatham, Ontario
August 11-13	Travel Chicago-Tokyo-Sydney-Orange