

AUSTRALIAN NUFFIELD FARMING SCHOLARSHIP



2000 SCHOLARSHIP REPORT

by

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**Environmentally Sustainable Production
With Low Chemical Input**

Sponsored by:

**Queensland Fruit and Vegetable Growers
Association & Horticulture Australia**

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1. Study Objectives

1.1 Integrated Pest Management Systems and Agricultural Practices Abroad

My participation in the Australian Nuffield Farming Association scholarship program was to primarily gather information globally, regarding low-chemical, low-fertiliser inputs for fruit and vegetable production. Whilst reviewing Integrated Pest Management (IPM) systems, assessment was to be made on the potential of Eco-Labeling as a means for enhancing revenues from the adoption of environmental technologies in agriculture. Using an eco-label for marketing and educational purposes is included in the assessment. It is with the notion that a current alliance between farmers in the Lockyer Valley, Queensland, could promote their ESP Eco-Label, based on the findings of this report. Their concept is still new within the Australian Market and it is called ESP – Environmentally Safe Produce.

ESP growers create fresh fruit and vegetables that are produced with minimal input of chemicals, whilst bringing a new level to food safety and ecosystem protection. The growers are adamant that their products are high quality, yet affordable to the consumer. They intend to guarantee food safety and pursue the concept of ecologically sustainable agriculture. ESP will understand the benefits and concerns related to integrated pest management farming, as a result of the study tour.

It was intended that particular attention be given to improvement strategies for the environmental aspects of various agricultural sectors, and to note the consumers' perceptions with regards to these issues. The ability to create a sustainable farming practice, whilst minimising inputs within environmentally acceptable standards would be investigated. It was accepted at the outset that these practices should produce quality products that could service a market and still be profitable for the farmer.

The reviewing process of IPM systems would include the comparisons between low-chemical to chemical and low-chemical to conventional farming practices, including marketing practices for each area, again with particular attention to eco-labeling.

It was expected that ample information would be available and that interest, other than the principal aims, would be directed to different areas. An area that would always be of importance is the issue of water quality and quantity in agricultural practices and, in particular, the use of recycled water for food production.

The success of organic produce abroad caused further exploration into areas other than IPM and included minimum tillage concepts, Consumer Supported Agriculture (CSA), Genetic Modification for agricultural purposes, including GMO for seed production.

2. Introduction

2.1 Brief Overview

This report is a result of a Nuffield Farming Scholarship study tour that occurred in mid-year, 2001 for a two-month period. The tour encompassed Singapore, Indonesia, Philippines, United States, Canada, Western Europe and England. Each destination resulted in absorption of information regarding various agricultural practices, falling under an umbrella of cultural differences and economic differences.

At the outset, five Nuffield Farming Scholars began their world tour, representing a cross-section of agricultural sectors within Australia. Each scholar had particular interests and all added value to the experience. The aim of the tour was to present the scholars with an overview of the agri-food industry, scientific research, consumer trends, Government issues, environmental considerations and future opportunities in each country.

This report will attempt to briefly address these issues for each of the countries visit, yet focus on the areas of IPM.

The tour consisted of organised meetings with small farmers, large producers, food processors, scientists, trade, industry and Government representatives, and those involved in the dissemination of research and technical information.

This report will attempt to involve interest areas, as well as a brief summary of each country.

2.2 Intended Areas of Interest

As previously stated, the intention of the study tour was to assess Integrated Pest Management systems and to consider their effectiveness in a global society. This is the result of personal business interests and the initiation of an eco-label with farming colleagues, located in the Lockyer Valley, Queensland. The concept was developed with colleagues after identifying the need to satisfy the growing concerns of environmental impacts that current farming practices were delivering to the land, as well as securing a consumer driven market. It is hoped that ESP, Environmentally Safe Produce, will be an extremely successful product and label in the fresh produce market within Australia, and eventually as an export label.

2.2.1 What is IPM and Why the Interest?

Integrated Pest Management (IPM) is a crop production program in which a combination of pest control techniques is used. The farmer does not rely completely on the regular scheduled use of chemical pesticides. Other methods are used, such as genetically resistant plants, natural enemies and destruction of places where pests breed. Only when those methods fail to control the pests does the farmer use chemical pesticides, as a last resort. With IPM, farmers reduce their use of pesticides by one-third or more. It is an

interdisciplinary approach to crop protection that attempts to balance environmental economic considerations in strategies that combine biological, physical and chemical methods for controlling pests. In the fight against crop damage, IPM relies on a diversified arsenal: data on weather, growing conditions and pest numbers; use of resistant crop varieties and crop rotation; introduction of beneficial insects; and spraying with chemical pesticides. Although chemical controls are used, pesticides are applied only when pest numbers reach levels that will cause sizable crop damage. Pesticides are carefully selected and applied to minimise disruption to the environment.

3. All Around The World

3.1 Singapore

The 2001 Nuffield Scholarship mid-year tour began in Singapore, a fine introduction to Asia due to its well-developed, clean and safe ambience. Singapore is a mecca for the import industry and it is surprising to learn that 90% of their fruit and vegetables is based on importing produce, the majority arriving from China, neighboring islands, Australia and New Zealand. Eighteen million shipping containers are unloaded each year at the 24-hour market, Pasir Panjang. This market is used as a central hub for South East Asia.

The consumer in Singapore has two passions in life, eating and shopping. Trends in food consumption are changing; many people live in Government owned buildings, which have a market underneath. Eating out is very cheap, and accommodation is such that home cooking is not an attractive option.

The consumer has a great trust in the Government. The government has a good track record in consumer protection – there were many examples where the government has been shown to have the consumers' interest at heart. Their strict guidelines and tough approach towards imports creates a sense of safety amongst consumers. Recently, Pork from Thailand failed industry standards and sanctions were placed on their imports as a result. Another example of this would be with Genetically Modified Organisms. The government has gone to great lengths to consult with consumers regarding the introduction of GMO. As a result, there is little knowledge regarding the impacts and a “wait and see” attitude is present, until more information is available.

The Singapore consumers are conscious of low-chemical production, and there are Government regulated checks on food safety. To this end, testing for pesticide residues were carried out at the market, particularly with products from Malaysia.

Sound government support is being offered to small and medium enterprises to nurture them into world-competitive companies. Science and technology is considered as a key driver for future economic development. This includes accessibility to the Internet for everyone, and encouraging an entrepreneurial spirit, beginning in schools and going through the education system to continue as a lifelong learning program.

The government embraces those that can add value to the economy, particularly in the science and technology arenas. This is a simple concept that is obviously effective – add value to your economy and build on your strengths. Being a world leader in technology, with a large percentage of the population having access to technology, the Internet arena for producers moving product is a reality and a market growth area.

The pace of the country indicates that the future will be paved with Internet shopping and convenience. Again, this will impact on the food industry. Internet purchasing of fresh produce for consumers is considered a growing area, with fruit and vegetables delivered to doorsteps. With the price of food, together with the structure of society, eating-out is a part of the Singapore lifestyle. Pre-packaged, convenience food is a part of their lifestyle, and will continue to be so. It was noticed with interest as an obvious pavement for future food production – quick and healthy. Fast lifestyles demand fast eating habits, and again, it must be highlighted that pre-pack meals for one are a common item in the supermarkets, markets and restaurants.

The consumers are very proud of their *clean and green* focus on their home base and are very concerned about what products are used and consumed. Low chemical or IPM produced food is extremely popular, with IPM products being affordable to 75% of the population.

Given this, there are definite Australian export opportunities, especially in the IPM areas. Singapore is renowned for the attitude of the quality and price theory, as opposed to the many other areas that were visited. With agriculture development in neighboring countries, coupled with low labor costs, pressure will be placed on the Australian agricultural sector in Singapore. It is of the utmost importance that Australian agriculture display with confidence their ability to provide *clean and green* products to Singapore, and further, it must be provided at a competitive price.

In conjunction with IPM produce export, there is an opportunity for Australia to supply Thai fragrant-type rice to Singapore, which is a large importer. Presently, Thailand supplies much of this high quality fragrant type.

3.2 Indonesia

A cultural change that slapped the face was met in Indonesia. Certainly, Australia is a safe haven and it cannot be regarded as anything but the Lucky Country, especially after viewing the streets of Jakarta. Being greeted by beggars is not a common occurrence in Grantham, Queensland, and therefore this alien routine by locals stirred emotions that were finally bedded with the acceptance of the Indonesian culture.

The island of Java, the most populated island of Indonesia, contained approximately 50% of the Indonesian population. Unfortunately, it also boasted 60% unemployment, albeit unofficial. Drifting from the heavy populated areas, a traditional simple farming system emerged, and it appeared that this added to the difficulties of producing products and transferring them to major markets.

Legislation in Indonesia prevents the individual from possessing more than 9ha. The land was expensive and labour inexpensive, being \$2 Australian per day for male employees and A\$1.20 for the females. Farm expansion is therefore limited and it would appear that the 3-4 acre properties were producing for the family table, rather than in a competitive business environment.

Labour costs are low (men earn \$1 US per day) which means that on average 15 people are employed/hectare in agricultural production systems. Only Indonesians can own land, and

this can only be 9 ha, so to develop any further, people would have to have considerable individual assets.

There is a big variety of production in Indonesia – from tea to vegetables, to medicinal herbs and subsistence rice. Production systems have to be developed to be cheap and withstand climate, for example lots of bamboo used in construction. Vegetable production, including sweet corn, tomatoes, peppers and Chinese leaf vegetables, was the main focus in Indonesia. Other meetings were held with those involved in inward investment into Indonesia, to understand how political instability is being reconciled with future growth and development.

Infrastructure is poor in Indonesia, and as previously stated, unemployment is high – approximately 50%. The fall of the currency in 1997 has had an economic impact from which the country has not fully recovered, although some recovery is underway due to foreign investment.

The twenty-two million people living in Jakarta alone (and 220 million people in the whole country) indicate that there are encouraging opportunities for food production, as long as the costs are internationally competitive. Examination of one fairly simple business venture (Amazing Farms) revealed that it is possible to create a business model and finance structure that can be competitive. The low-pesticide issue is also a key marketing issue, which can lead to a competitive edge. This, in conjunction with another production system marketing sweet corn, revealed that at the farmer level there is much innovation, but they need business skills and marketing and distribution opportunity. This can only be achieved with capital investment.

Research programs generally are only funded for 12 months. Farmers have little access to technology and when they have specific agronomic questions, solutions are not readily available.

Culturally, the need for good planning and investment in time means that business develops slowly. One initiative took five years in the planning before it came to fruition.

One opportunity that does exist and should be explored is in the development of natural medicines. The country has the capability to produce the herbs, but development is needed to make the delivery more accessible (eg in tablet form rather than in herbs that need brewing in large volumes). Another obvious potential market could be based on Indonesia being the second largest consumer of noodles in the world, illustrating trade opportunities. In addition, price is an important choice factor to consumers, which can potentially influence the markets.

In summary, although the potential for investment is high, the infrastructure, problems with community relations and the environment can lead to the country being undermined as a potential investment area.

3.2.1 Research and Government Contribution

The diminished wealth of the Indonesian farming areas since 1990 is a result of the collapse of the government. Minimum government funds for research and development are returned to the agricultural communities, which inadvertently places further pressure on the producer.

Science and Industry within Indonesia copes with high demands in their attempts to balance the requirements of society. Research and development are constantly exploring innovation in an attempt to remain fresh, solve problems and ward off negatives proposed by various lobby groups. It is admirable that research and development are challenged by the agricultural sector to eliminate impediments.

To access and utilise results of implemented programs appeared difficult for the “normal” farmer. Those farming in the less developed countries felt at a disadvantage to the “super powers” of agriculture, with the majority of research funding being filtered back to those areas first. The ability for currency to communicate is obviously universal.

Emerging new ventures within Indonesia has been on the rise during the past 3-4 years. The majority of these ventures are born from overseas developments. It is devastating that visionary ideas that could solve social problems are not supported to the level that they should be by the government. The Indonesian farmer still attempts to embrace new developments with enthusiasm. The lack of government funding forces many of these farmers to combine new methods with their own practices. It is appreciated that improved infrastructure would automatically assist the process. Further, the lack of government support, despite several requests to address the whole food sector and create greater self-sufficiency for the communities, has added to the unconstructive political climate.

3.3 Philippines

The main focus for this section of the tour was research into rice improvement. Again, the exposed cultural differences left an impact. This aside, the Philippines, like all Asian countries, claimed rice as the majority of their staple diet. A tour of the International Rice Research Institute (IRRS), Los Banos, was very informative.

The IRRI is part of CGIAR, the Consultative Group of International Agricultural Research. It is funded by donation from seventy international partners, representing forty collaborative countries, working in partnership to feed a growing population and sustain fragile environments. It is staggering when one considers that 24 babies born every 10 seconds worldwide illustrates the growing need for greater food production and better distribution. In 1999 alone, 587 million tones of rice were produced from 153 million hectares of land.

The IRRI has four research themes, focusing on the four areas of rice production upland (5%), rain-fed lowland (18%), irrigated (54%) flood prone (33% of total area production). Irrigated rice contributes 80% of total rice production worldwide.

There were notions amongst some researchers that science can feed the world, given sufficient resources. Their passion is obvious and is a result of understanding the lack of food production that is causing many countries to starve. It was observed by some members of the research community that the world's population will stabilise by around 2050, at 9-10 billion. There were also discussions about the GM debate – many IRRI innovations have yet to be approved for public release, in fact there is no field testing of transgenic crops in the Philippines, as there is an issue of public acceptability of GM crops to be overcome. With regard to organic production, it was highlighted by a fellow scholar that “the demons have yet to emerge” as far as public perception of food safety is concerned.

This demonstrated the need for links between the farm and the scientist to be further developed. Communication is poor, both to convey the needs of the scientists in terms of future field trials, as well as for good relations. Communication between scientists also appeared to be lacking, and, despite exciting and innovative research being enthusiastically carried out, it was observed that the levels of communication from the scientists to the farmers should be improved. The need for extension to the farmer level is a necessity.

A public relations expert has been appointed to promote IRRI research and communicate it externally to the media etc. Future focus of external communication is issues-led, rather than science led, as representatives from the donor countries are no longer scientists.

3.3.1 Philippine Wet Markets

For the purpose of this study, the Philippine Wet Markets provided a fascinating insight into a traditional marketing system that is slowly being accepted by dominating world organizations in supermarkets and hypermarkets. The traditional markets consist of all fresh products, including fruit and vegetables, rice, meat, fish and chicken. The Wet Market exists in the centre of each town and operates 7 days a week from 6am to 6pm. The producers have no refrigeration or chillers; they use slate beds and ice to keep produce cool. The ancient practices of the markets displayed minimum influence from the practices of western society, adding to the appeal.

On a near daily basis, fresh fruit and vegetables are transferred from local fields and sold to consumers in excellent condition. Having only one day to sell proves that selling is not just about food production, but how customers are educated and perceive markets and concepts. Various grades of rice, both quality and price, is also available. The fresh water fish is sourced from fresh water lakes surrounding Los Bonos and backing on to Manila. The ocean fish are fished usually a day or two earlier and are stored in oversized fish traps. They are dispersed upon demand from the consumers. It is overwhelming that the fish are still alive at the market and cleaned in front of the consumer. Fresh, fresh, fresh is certainly the order at the Philippine Wet Market.

Pork and beef are common meats, with chicken being the most common of all. The pork and beef are always freshly killed in the early morning. Strict monitoring is in place with a government standard stamp placed on the carcass. Consumers are aware that they must view the stamp, without this mark there is no sale and government inspectors are informed.

The low overhead, family businesses that lead the wet market system is under increasing pressure from European food retailers to modernise. This would see the traditional

methods of buying and selling dramatically reduced. Retail giants dispersing their products have addressed the overheads and small margins and sell them on a margin that appears to be only slightly higher. The opportunity to purchase frozen meats and vegetables is slowly becoming more relevant with the comfort and ease of air-conditioned shopping centers.

From an export view, it would be extremely difficult to place product into these markets, due to the wealth of the product that is readily available locally, coupled with the minimum overheads. However, from a supply point, it could be assumed that the traditional market will continue to successfully function. The realisation that only one in four Philippines is in possession of a fridge, yet is within accessibility to a market contributes to this theory.

With regard to organic and IPM produced foods, the consumers were aware that these systems existed, yet appeared content with their present system. The local farmer, usually representing the low-economic sector of the Philippines, used traditional methods, as insecticides and fungicides were financially out of reach. With the abundant amount of labour available and undeveloped infrastructure in place, it is more economical to use hand labour than tractors and machinery. Smallholdings again force a barter system, as opposed to a change of money.

Concluding, comparisons of a wet market and a modern supermarket revealed stark contrasts. The volume of freezer space in the supermarket was very low – demonstrating the importance of fresh food to consumers. The wet market has no refrigeration or chillers, but food safety does not seem to be an issue, due to people shopping daily on a need-to-eat basis. Product is sold within one day, so the short time between purchase and consumption minimised the possibility of contamination. The price differential between the supermarket and the wet market was about 30% and there was also a perception that the supermarket provides a higher-class way of shopping.

3.2 United States of America

The second section of the mid-year tour was based in California, and covered the farming area from Los Angeles through the Salinas Valley, Sacramento, and the Nappa Valley, down to San Francisco. Information was shared with researchers, large scale fruit, vegetable and nut producers and processors, smaller scale farmers (both conventional and organic) and explored issues of political and economic significance for agriculture, including water and energy availability, market forces and export issues. The relationship between growers, processors, extension services and the research community was also observed in detail.

California, in its own right, is the fifth largest economy world wide, and visiting the largest farming enterprises world wide resulted in the question of why they were decorated in For Sale pickets. It is evident that USA farmers are facing the same problems as the small farmers in Asia and the Philippines, and farming organisations in Australia and Europe. The consumer and governments are not understanding or do not want to understand the problems facing food production worldwide. California provided a dramatic contrast to South East Asia. The difference in scale of agricultural production was considerable.

America provided a huge learning curve as far as environmental agricultural practices were concerned. The majority of the population was aware of “green” issues, and assisted accordingly. This was demonstrated by the support given to integrated pest management

products, the government support and the farmer initiative to work towards problem solving.

Departing from America just prior to the September 11 tragedy impacted on all those involved in the tour. The fear of terrorism was felt worldwide and being absent from loved ones made this feeling greater.

4. Trends in Packaging and Labeling

4.1 Asia

Traveling the globe reinforces the fact that the world is moving at an incredibly fast pace. The majority of people are searching for fast and easy options, with regards to food preparation. Singapore functioned on the 9am to 5pm working day scenario, intensified by high rise buildings due to lack of space. It is surprising to learn that many high-density residents are constructed without kitchens or cooking facilities. This greatly contributes to the industry that surrounds dining out establishments. Food consumption is a large part of the lifestyle in Singapore and a large proportion of wages is allocated to eating.

At the time of the tour, organic food holds a small component of the market place, with approximately 4% of the sector. IPM labeled and low chemical labeling is gaining in popularity and, regardless of where the food is consumed, consumers are requesting this type of product.

Presentation, packaging and low chemical labeling is well accepted in Indonesia. Chinese Lettuce, grown by Amazing Farms, was experiencing success with their no chemical marketing, as was Raymond, a producer of no-chemical sweet corn.

It was encouraging to witness middle classed Indonesians willing to pay a premium for low chemical, slightly pre-packed products.

The limitation of keeping products fresh, due to the lack of available refrigeration, is the reason for the Philippines culture centering on their traditional markets. Having an intimate knowledge of their local farming community, the consumers are aware of the low chemical inputs in the available produce. Fresh is Best is an adage that is very evident within the Philippines food culture, which in turn contributes to their eating culture. Customers know and understand their markets and are resisting dramatic change from western influences.

4.2 USA and Canada

Genetically Modified Organisms (GMO) is very topical with the marketing of produce in the USA and Canada. Despite the apparent ease to grow the “ultimate” produce at all times in all areas, did not appear to be a good enough reason for consumer support.

Organic production of produce is experiencing strong growth for marketing purposes, with the demand approximately at 10%. Organic produce was readily available in all areas of America and Canada, taking place on supermarket shelves next to similar items from other countries that fill the void. At this stage, America cannot independently supply the demand for organic produce. Strengthened by the consumers thirst for nutritional facts and health benefits from organic, the market is growing, yet the price is stagnant.

In New York, low chemical produce and, in particular, the IPM system, is the forerunner within the market places. Education of the consumer regarding the process has witnessed rapid growth. As environmental issues shoot to the front row of issues being tackled by modern societies, food consumption becomes a part of it. This prompts the question as to why organic food is not readily available at affordable prices for consumers. Given the food safety issues that are prominent, it would be assumed that such products that are grown to safety standards should be affordable.

Whether dining in a restaurant or eating at home, the fast food addicts of America and Canada are searching harder for IPM products to consume. This has resulted in the growth of the organic industry in these areas, during the last five years. Additionally, consumers opposing GMO has forced research into conventional, IPM and organic farming practices, minus the use of GM seeds.

The American government does not possess the relevant, adequate research and data on IPM practices etc, as it did not expect the rejection of GM. Research programs being conducted that will compare farming with GM sourced products to conventionally sourced products over a five-year period in different areas and climates are now being undertaken by Cornell University. The governments are heavily funding schemes, such as this, as it will demonstrate their good intentions and cloak their support of GMO products.

Increasing global populations has resulted in the USA exporting vast quantities of products, however, a lack of available farming land will force the government to address many issues. Past thoughts of better technology in seed production-using GM was yesterdays solution and will not service the modern consumer.

The United States government possesses a different view than the rest of the world, regarding GM issues. Extensive work has been completed in the US, to the approval of the majority of conventional farmers. 200 of the 300 million population further supports GM within reason.

5. Research and Government Contributions

5.1 Canada

The Government heavily supports the Canadian Research and Development sector, as it progresses with the GM industry. Farmers readily accept GM, especially in the broad acre crops of wheat and corn. The Canadian public appeared to be as comfortable with the concept as their border country of America, removing themselves from the “Frankenstein Food” images that are portrayed in other areas of the world.

The governments of Canada and America have embraced the concept that GMO is the future for large-scale farming. Despite this, the area is not cushioned with funding and Canada is still exporting mass amounts of products to countries that do not readily tolerate this style of farming. A considerable amount of funding is still being put into IPM and conventional farming methods. IPM and low chemical use will continue to be funded by the government and will demand more funds, given the pressure from environmental

groups and native title issues, coupled with the stalemate of GM low-chemical and low fertiliser inputs.

From a farming perspective, GMO is an incredible tool that has been stalled by the government wanting to ensure that it is globally accepted, especially with major importing countries.

5.2 England

As previously mentioned, the tragedy of September 11 made this part of the tour eerie. The first time away from home with the world on alert was something that will never be forgotten. Joined by Narelle Scultz during the second week of the England leg was comforting, yet the uneasiness still remained from here on in.

English farmers walk fine lines concerning GMO issues. The governments in England, both past and present, are well aware of the issues abroad, especially America and Europe. The public appears to be against toward GMO developments. The government has still implemented long-term research programs in their efforts to collate accurate data on the issue. The agriculture community in England is still bruised, due to recent outbreaks of Foot and Mouth and Mad Cow diseases. Extensive work is being conducted through the National Farmers Union to rebuild the image of farming and associated produce. This is aided by the national health authority promoting the high quality of English agriculture. The government has also allocated mass funding for farmers through grants to assist their practice and to regaining the confidence of international markets. It is perceived that English agriculture will become competitive and profitable in the future.

5.3 Europe

Holland, Belgium and Germany were explored and it was found that GM was totally unacceptable. The governing bodies appear negative and protective of their decisions that as GM was not required for success in the past, it would not be required for the future. This attitude existed with seed breeding companies, with no research at all being undertaken to address GMO. Most importantly, the farmers did not discuss the issue and appeared uncomfortable discussing the concept.

All research was devoted to improving the mainstream varieties and exploring new varieties, minus the “Frankenstein Food” elements. With the growing demand for organic products within these countries, the main focus was on improving what has already been achieved and developing the organic industry into an everyday practice for the consumers.

IPM was as high on the agenda as organic, with consumers seeking out produce that were identified as such. With ongoing research into low-chemical use, the consumer felt more relaxed with the products available. Again, this supports the notion of ESP being a successful label in Australia and abroad. The organic production has a foot firmly on the ground worldwide. This did not happen over night, rather it has been a battle for farmers and researchers alike.

6. Seed Production, Low Chemical and Conventional

As the world continually changes, so do certain aspects of seed production. As farming practices adapt to consumer requirements, so too does seed production alter. Breeding new varieties that are suitable for different soil types, weather conditions, prevention of diseases, deter insect pressures and have maximum growth results with minimum water and chemical requirements is an industry on its own.

Seed organisations are constantly producing new varieties of seeds, with hundreds being trialed daily. Farmers express their belief that seed companies could be assisting their businesses, however they are reluctant to give their support for GMO work being carried out, especially in Europe. The support shown by farmers in Canada and the United States was overwhelming for GMO products, with farmers demonstrating how easy it was to grow a crop from seed to harvest. Governments in these countries giving financial support to GM assist them, whereas the European governments do not give the same level of support, making it difficult for seed producers to define their direction. A farmer in the Ontario area of Canada confirmed the view of many farmers by stating that “GM is so easy – it is good for us, just don’t tell the public.”

7. Organic Seed Production

With the global stance on GMO products lacking consistency, research and development into this area is strong, however there are no apparent actions at this point in time. Bojo Seeds of Holland is an example of one European organisation confident that the market will exist for GMO products in the near future.

Organic organisations throughout Europe and America are required by recently passed legislation that they will only be acknowledged if using seed that is grown by a registered organic seed production company. Bogo Seeds have been working on trials, whilst going through the process of becoming an organic producer themselves, this is due to their vision for the future market in this area.

The cost of organic seed is going to be approximately 2.5 to 3 times the cost of current seed production. With laws in place now, to come into action from 2004, organic lobby groups are actively working to promote their new achievements. The GMO theory in seed production is completely rejected, however, hybrid seed is currently accepted and will be so until the date set in 2004, when they will be rejected. It is ironic that the seed presently being produced by seed companies now and into the future will be produced organically, but from technology that has been using hybrid seed for two decades.

8. Marketing

8.1 Marketing in USA and Canada - Conventional to IPM

Touring from country to country, starting in Asia and finishing in Germany, it was evident that a majority of the consumers are aware of the different market elements that are available to them. There is a decreasing number of consumers that consider better looking produce or how it is grown and by what standards. The supermarkets throughout the United States and Canada stand by their commitment to their customers to give them the best looking product, at the cheapest possible price. They are more mindful of the full production history of the product in their market space.

Many supermarkets do not help to market the produce for its merits, they market it by the price and then the quality. The exception is the Wegmans chain in New York State. This progressive chain has identified that the public is more aware of the chemical and fertiliser downside on crops and the perception the consumer has about this has prompted their inclusion of organic alternatives.

Integrated Pest Management has been adopted within their stores, giving preference to IPM farmers over conventional farmers. The IPM experiences strong support in Wegmans, both in the fresh and processed vegetables and fruit.

Organic produce is creating some interest, with the increase in production and the drop in price on the market shelf. With the new era of seed production imminent, the premium price is being reduced to 0% to 25% premium. This certainly prompts the question of pricing for organic produce in the forthcoming years, given the new legislation requirements.

The expectations of the market consumers are unrealistic and include accessing produce at present prices. The premium is disappearing for the growers in the organic arena, and it can be compared to the market prices that were driven down by corporate supermarkets within the conventional farming fields. It is outrageous and an area that does require government input – the supermarkets requiring market share and forcing the farmer to carry the costs, ultimately causing the farmer to be the loser. However, this is not to say that the farmer cannot experience success under the current conditions and in a global, economic driven environment. It is fair to say that many farmers are their own worst enemy and, as in other areas of business, the agricultural industry requires farmers to unite together to create the strength required to be competitive. Whether conventional farming methods, organic or IPM, a difficult road lies before the farmer that is not prepared to work together. Individual farmers are realising that direct marketing to the chains or through a wholesale market area is less appealing and becoming less profitable in America and Canada, where they are delivering into other outlets.

Farmers markets are an example of an outlet that is becoming popular for farmers to liaise with the public. A registration is obtained for each market from the producer, guaranteeing standards. This, coupled with the producer being able to directly communicate with the consumer, is a positive public relations exercise for the industry. Certainly, this is an area where conventional and organic produce can work side-by-side and share information with

the consumers of their goods regarding the day-to-day operations of their farm. This market environment has been beneficial for organic products and high sales indicate that the target audience in attendance is environmentally conscious and aware of the possibility of certain substances and processes carried out on their consumables. The premium is paid to organic at these markets, adding to their attraction from the farmers' point of view.

Low chemical and full IPM is gaining momentum in the farmers' market scenario. With full traceability available, the consumer is starting to appreciate IPM produce and are viewing it as an affordable, realistic alternative, given that full IPM grows very closely to organically produced product. The public enjoys the benefits of organic, however, are not willing to pay the premium, which is deserved and required by the farmer. IPM has a reduced premium, yet it is still affordable.

Steve Porter, an organic farmer from New York State, is one of a large number of farmers that have entered into C.S.A., Community Supported Agriculture. CSA allows the consumer the chance to identify during the off-season what crops would be attractive to them in a season, allowing the farmer to plan his cropping activities based on the information provided by his customers.

The consumer is invited to participate in farming activities, through a roster system. The ownership that results from this involvement creates a loyalty that is mutually beneficial to the farmer and consumer. The CSA system works on the basis that the consumer financially supports the growing season and is therefore involved in the losses and/or low yielding crops, as well as sharing successes. The concept is growing rapidly, although it does have some negatives. Quality is sometimes an issue and is not usually an issue until the year's end, when the consumers do not resign for next season. Further, participants fail to understand how to grow produce against the forces of nature and still expect 100% produce, 100% of the time. This lack of understanding forces the consumer to return to traditional markets and purchase fully produced products from conventional methods, oblivious to their efforts in contributing to the environment.

9. Simple Yet Effective - The Amish and Mennonite Regime

The Amish and Mennonite farming family communities are close knit and the opportunity to experience their hospitality, not to mention living in a world within a world, is one that should not be passed. It is their initial and lasting help and respect to visitors and to themselves that is to be admired. The Amish have totally simplistic lifestyles centering on basic needs, whilst the Mennonite communities have embraced some modern facilities, electricity being the most obvious.

Successful field days are an unassuming marketing tool for these communities. Field days are supported and invited into their farming areas. Wilmer Newsanger, a Mennonite farmer in the Cumberland County, together with his family, host a field day for friends, both old and new. The farm is a total of 70 acres, using IPM as the basis for their eggs, chickens, turkeys, beef and cheese industries. All Newsanger's products are produced under a free-range system, with people regularly visiting the farm to purchase products after viewing them.

The chicken and turkeys are slaughtered on a very regular basis, with birds being ordered and available for pick-up or delivery. The small slaughter areas is inspected and

monitored by meat inspectors whilst the program is occurring. At present, the beef is sent to a local butcher for processing, however, there are plans of incorporating this on site in the near future. Approximately 26 jersey cows are milked daily, with the milk being stored for two to three days before it is transformed into a variety of cheeses. This results on average 550-600 pounds of cheese weekly.

With the products at hand for Newsanger and his family, there is ample work to perform. Public demands are just being met on most products. Typical of the Mennonite or Amish farmer, the belief exists that regardless of the size of acreage, value adding to the product is the true marketing edge. The philosophy of making \$3 000 per acre from 70 acres as opposed to farming 700 acres to make \$300 per acre is one that cannot be argued!

The contrast of farming practices in the Pennsylvania and New York areas is stark. On one side of the road, you have large production farming, with gigantic and expensive tractors and machinery whilst directly opposite is the Amish farmer walking behind a horse and plough. The irony exists that in the challenge of the horse versus the tractor, the horse is still ploughing as the tractor runs out of diesel. The Amish communities are purchasing many conventional farms and the conventional farmer is left standing in disbelief.

10. Toil the Soil

10.1 Soil and Working with Soil Management

Globally, the green movement is on the rise. In the developed countries, especially USA, England and parts of Europe, there is a noticeable push from the extremist green sectors to label the farmer as destructive and uncaring towards their environments. Despite debates between farmer groups and green groups occurring for decades, the modern farmer is more often than not very responsible with the products and techniques that is applied to his agricultural practices. Foremost, farmers know that they have ownership of an area of land and they desire that land to be sustainable.

The modern farmer is aware of the soil type and would test on a regular basis for existing nutrients, so as to only add those required and not abuse additives. Education and government implementations make this process easier. The fine margins that exist for the agricultural sector across the globe, makes it more appealing for the producer to understand the most effective processes for working the soil and improving crop value through additives. Holland appears to experience stringent soil management controls by government legislation towards their primary producers.

Strict rules that force the farmer to be conscious about what is being applied to the soil and to the timing of products, especially composts and nitrogen fertilisers govern the use of fertilisers and chemicals. The impact that excess nutrients resulting from over fertilisation are having on the waterways can no longer be tolerated. The farmers of Europe are under incredible pressure to reduce nitrogen inputs from chemical or compost fertilisation.

Many areas of agriculture have become increasingly aware of the importance of soil organic matter in relation to sustained soil quality or function. Soil carbon is closely linked to many desirable soil physical, chemical and biological properties that are associated with

enhanced soil productivity and quality. Further, awareness has also increased concerning the negative impact tillage has upon the soil, and in turn the produce.

Moderate tillage may provide more favorable soil conditions for crop growth and development and weed control over the short term, intensive tillage of agricultural soils has historically led to substantial losses of soil carbon. Conventional tillage practices disrupt soil aggregates exposing more organic matter to microbial degradation and oxidation and are one of the primary causes of deterioration over the long-term.

Deep tillage, as is customarily done as a routine “soil preparation operation,” is also costly and requires high energy and increased subsequent effort to prepare seed beds. Adoption of conservation tillage practices could be a viable means for improving profitability and reducing energy use, and improving soil quality. Conservation tillage systems aim at reducing primary tillage operations such as plowing, ripping, disking and chiseling. As a result of this deliberate reduction in tractor operations, surface residues accumulate and must be managed. Conservation tillage has been defined as a production system in which 30% or more of the soil surface is covered with residue. These surface residues may also serve to reduce evaporation from the soil surface and thereby conserve water. The use of conservation tillage techniques has in some areas of the States evolved over the last several decades largely as an effort to reduce soil erosion.

10.2 Soil and Asia

Despite the green movement not as impacting as in western areas, farming communities within Asian societies were still acutely aware of the management of their small holdings. Land has been extensively farmed for hundreds of years, with careful attention paid to erosion and, more recently, what was being applied to the soils. Farmers in the poorer agricultural sectors of Indonesia and the Philippines displayed a great respect towards their lands. One small farmer in status, but not in heart, had five acres of land for rice production stated that “this is all I have, so why would I use products that could destroy what little I possess?” It could be said that they do not have the monies for fertilisers and chemicals; however, it is easier to believe that they have a richer respect for their land.

As the tour progressed, it became more apparent that farmers on a large scale or a small scale can see the problems that farming practices have created and many are working tirelessly in attempts to address this. Governments worldwide are implementing restrictions of certain chemical and fertiliser use and soil treatments, believing that they are not only aiding the farming communities but assisting the consumer.

With Integrated Pest Management Systems becoming more prominent, from Asia to Europe, the message is reaching the consumer that farmers are aware of their practices.

10.3 Soil Erosion

Consumers are concerned with environmental impacts upon farming lands and are requesting information about preventative measures. Areas throughout Europe are now featuring trees and hedges around their perimeters, whilst Canada and USA have replanted mass areas to address erosion and soil degradation. Across the board, farmers are more responsible for the soils that they work.

The world is using IPM farming and a “greener” approach to all of their farming practices. From low commodity prices and high input prices, the farmers are looking to new and diverse ways of farming, with organic movements present in most world markets. The agricultural industry as a whole are looking at a new era in farming, with concerns from the green groups, government’s consumers and the farmer themselves. The era of clever and safe farming is here. If the consumer now demands environmentally sustainable farming practices, the entire agricultural sector could be forced to adopt new practices. This new style of farming is indicative of the farmer being aware that it is a balancing act for the environment and an acknowledgment that they need the consumer, as much as the consumer needs them.

11. Growing and Crop Protection

With the ever-increasing pressures of the governments and the publics, crop protection is becoming specialised. Regardless of the economic status of the country, all agricultural areas were focusing on the reduction of inputs, whilst maintaining profit margins. In some areas, this is government imposed. The presence of agronomists is expanding and, whether they are government funded or at a cost to the farmer, the benefits from expert advice are essential for sustainable farming. Consumer Supported Agriculture (C.S.A.) and similar groups are globally on the rise.

12. IPM Education

All countries that were visited during the tour were concerned about Integrated Pest Management. Throughout Asia, America, Canada, England and Western Europe, IPM practices were in use.

Conscious of low chemical food without the price tags of organic was very common in all areas. It could be said that 90% of the consumers that purchased IPM products were not aware of the benefits or understood the difference between their chosen product and the one remaining on the shelf.

Farmers and farming advisory groups are in constant discussion regarding the development of IPM systems, however, in their implementation they are failing to pass information onto the consumer. A small logo on a product may aid in the identification, but it fails in the education process.

The University of Massachusetts, under the renowned leadership of Dr Craig Hollingsworth, is strategically developing IPM programs and guidelines for farmers to consumers. It begins with the correct practices for the farmer. The IPM farmer must be approved. The process results in the consumer being educated on the benefits of IPM products, together with their ability to identify and IPM logo and understanding what it means for a product to boast such a logo.

Similar programs are in place with the Cornell University of New York State, with the differences centering on the different climates and conditions. With support from Wegmans Supermarket of New York State, the IPM produce was available in fresh and

processed lines. The consumer is able to readily access information in-store regarding IPM, through pamphlets, posters, farmers and organisations.

The wider public access to all the information that is available on IPM comforts the consumer that farming communities are doing everything possible to reduce inputs, whilst still delivering quality product.

An IPM education program has been adopted by the Pennsylvania Government and introduced into schools. IPM holds the same status as English and Mathematics within the curriculum. This program is applauded by many other states and countries, and rightly so. As the youth become consumers, they will possess the required knowledge on IPM and will be armed to make an informed decision on their choice of product.

In today's environment, consumers are increasingly wary of the food supply; they seek assurance that their food is safe.

Growers need a mechanism to demonstrate to consumers that their produce is safe. Many farmers have attempted organically produced food. However, considerations of produce availability, quality and price, as well as technology and production costs, limit the production of organic produce.

Another attempt to allay consumers' concern over food safety has been the use of a "low spray" or "IPM" label on produce. The labeling has been limited, as no generally accepted standards for these categories exist.

Through educational materials and programs, increased knowledge of Integrated Pest Management can be expected. Jobs can be created as a result of growers wanting more information and hiring consultants etc.

Increased use of IPM will result in reduced pesticide use. Growers using IPM certification on their produce will reap a marketing advantage, when consumers, educated to IPM labeling, purchase produce that they know has been grown using practices minimising environmental disruption, and with minimal safe pesticide use.

The public is concerned about the use of pesticides and residues found in foods and in the environment. Many farmers want to assure the public that their farming practices are environmentally responsible. This reassurance becomes more important in the increasingly urbanized landscape.

Part of the solution is education. Growers need to learn and use more techniques to reduce pesticide use, and the public needs to learn what growers are doing to reduce pesticide use. Cooperative extension has been successful in educating farmers in pesticide reduction techniques.

IPM has value as an education tool; to enhance the public's understanding of agriculture, to improve urban-agricultural relationships, and to increase the public's confidence in the food supply. Marketing their use of IPM provides one method for farmers to participate in the educational process.

13. Less Horse Power for More Rewards

In all countries it is more than obvious that every possible avenue has been explored on how or reduce any part of input from the farmer end. With little wealth in Asia, all work is done from start to finish by hand. Virgin land that has never been touched in any manner is cleaned by hand, cultivated by hand and planted by hand – all harvesting and packaging is done by hand. This is the farming style to which the community is accustomed to and is indicative of the small holdings and large numbers of people willing to work for relatively low wages. The environmental issues are also a factor for continuing with this style of farming.

In America and Canada it was very common to hear farmers asking for more from their machinery, yet using less horsepower. The farming practices of the Amish demanded respect from many other farming sectors. The areas may not be covered in a set time, like the area being worked by a tractor next door, however, the end results were just as realistic minus the overheads.

The use of machinery within the vegetable industry was being overhauled with a little more focus of down sizing and then incorporating two pieces of machinery together. Ideas like this were being driven by the farmers as they firstly tried to reduce costs and secondly tried to use less passes, thus eliminating the extra pressures on the environment.

Farmers within the broad acre crops were more advanced than vegetable producers in the areas of minimum to zero till concepts. With increasing pressures from the environmental bodies, farmers at the rate of approximately 5% per annum.

14. Overview of Trends and Labels

The fight for survival has never been more apparent than it is right now. Firstly with the GM, food is being rejected by most of the world's population. The drawing board had to be retrieved from the scrap heap. Continuing along these lines of marketing possibly just for the time being is the wrong approach. Consumers are not ready for this phase of science, as yet, but with careful research and development and a focus on selling the good points it could be part of the future.

The organic has had an overwhelming success with past problems and the newer ones, including GM. The organic industry has held its head high through our time. Always improving on what were once weaker points. Good marketing and good management practices have been strong holds, but with all the downers in the conventional farming systems, it still is amazing that it only holds 10% worldwide.

The IPM and green eco-style labels have become well accepted, with almost all farms practicing certain aspects of IPM and the “drive-by” consumer understanding more and more of the environment, IPM is moving forward with the focus of mixing science in with mother nature and finding the boundaries that each one will go to. It is a great basis for the IPM market.

With supermarkets in the non-Asian countries having the main source of food purchasing for a long period is coming under pressure. New marketing and new packaging has become a huge part of survival.

15. Conclusion

The Australian Nuffield Farming Association scholarship program has allowed this farmer to understand in depth the potential for integrated pest management farming to be part of mainstream practices locally. The concept is workable and is sourced by consumers. Australia is not demanding of such practices, and many would say that this is a result of its “safe-haven” perception on a world scale.

The ESP label that is being promoted from the Lockyer Valley in Queensland, Australia, does possess the correct ideologies that will make it a marketable product both locally and abroad. In fact, the market for export opportunities for ESP and the Lockyer Valley farmers, potentially outweighs the national market, due to the lack of understanding from the consumer point of view, and the lack of financial support in government funding towards education highlighting low-chemical, low-fertiliser farming practices.

In recent years, consumer’s interests have expanded beyond traditional nutrition and food safety information to include interest in the impacts of food production on the environment. It can be concluded that items promoted as having a ‘green connection’ have a secured section of the market that is constantly being expanded.

The majority of growers want to switch away from pesticides, but the marketplace must reward them. This is the biggest downfall in Australia – the consumer wants glamour products but does not want to pay for it. There needs to be a two way street between the producer and the consumer and the government must be acting as the traffic signs.

The Australian Government is obviously not taking notice of what is occurring overseas. For if they were, preventative measures would be enforced now, in order to prevent what is already occurring in other countries where irreversible damage due to inappropriate farming practices has taken place, especially in the western worlds.

The current government has a responsibility to assist those farmers that are trying to protect their land and the most obvious way that they can do this is to educate consumers on integrated pest management and entice farmers to reverse their current practices.

One possibility is to promote IPM produce to the consumers, giving them a choice in the market. At some point, third parties would certify that produce is being grown with high-intensity IPM. To reach the goal of having most produce grown using intense IPM, it has been said that a national commitment with research money redirected into IPM would be required.

Cornell University is currently conducting research into the effects on the environment between different farming practices, including conventional, organic and IPM. The results will provide answers for consumers about what is safe. Much opposition will be received from major chemical and fertiliser companies. It is ironic that many of these companies, are investing into bio-chemical practices.

As mentioned previously, organic food is popular amongst consumers yet it is not supported to the level that it should be due. This is perplexing due to the obvious trend for populations leaning towards environmental issues with regards to food production. One concept is the pricing, however, in the USA this is coming into line. Another theory is the perception from the consumer on how a product should appear on the shelf. If an item looks good, it has the edge on organic produce that may not appear as inviting to the consumer. Again, produce grown under IPM systems will have the “look” that is required by the consumer, as well as the environmental standards.

Large supermarket chains across the globe have already identified produce grown under IPM systems as the forerunner for their fruit and vegetable sections. Again, this is encouraging for the ESP label in the Lockyer Valley and pitches to major supermarkets in Australia are now underway, with the hope that they too will be learning from their overseas counterparts.

Consumer Supported Agriculture (CSA) is a concept that has merit as it allows the opportunity for consumers, especially those in the city areas, to understand the practices that occur for their food production. It is educational for the persons involved, as they learn from the farmers first hand about the difficulties that the farmer undergoes in their attempts to provide quality produce. It was disappointing to learn that many people involved in the on-farm experience still expected A1, quality produce, again reinforcing the difficulties for a modern day farmer as they are still dictated to by consumer driven market practices.

In conclusion, the Nuffield Scholarship Study Tour has shown me the diverse farming practices throughout Asia, America, Canada and Europe. Unfortunately, due to the terrorism fear that resulted from September 11, the intention of exploring water issues and farming practices in the Middle East were postponed. However, it is intended that these areas will be explored in the future.

From a 22 hectare farm in Grantham, Lockyer Valley, Queensland where it was thought that everything performed was perfect, this tour has opened up so many possibilities for how this little block of land will be successfully farmed in the future. The concepts of traditional farming practices, incorporated IPM and minimum tillage will be explored. These are concepts that have already been shared with farming neighbours and the wider community and it is envisaged that they will be adopted when an understanding of the benefits exist. They will have to exist from a marketing point of view, a government point of view and, of course, the consumer point of view.