ology Working Group sponsored a workshop to focus on "Apple Cultivars—Current Situation and Future Trends Around the World." Major apple production areas were identified for discussion including Western Europe, Japan, Australia and New Zealand, and the United States. Invited speakers were asked to present data on cultivars currently planted and prospects for the 1990's. A written account of each formal presentation is presented in this issue of the *Fruit Varieties Journal*. A list of recent references covering apple varieties and production trends is provided for those who desire additional information.

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Fruit Varieties Journal 45(2):76-79 1991

Apple Cultivars– Current Situation and Future Trends Around the World– Australia and New Zealand

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Abstract

World apple production has increased markedly in the past decade. All major production areas of the southern hemisphere except Australia have increased their apple production. A dramatic increase in apple plantings has occurred in New Zealand. 'Granny Smith,' 'Cox's Orange Pippin,' 'Delicious' and 'Golden Delicious' are the leading cultivars in that country. 'Gala,' 'Fuji,' 'Braeburn' and spur 'Delicious' trees were heavily planted during the 1980's, while processing cultivars such as 'Sturmer Pippin' were declining in New Zealand.

World-wide apple production is increasing. Production increased from 30 million to 38 million MT recently (1). While production in the United States has also increased, it has increased at a slightly slower rate than worldwide production (1).

In the Southern Hemisphere, production in all major areas except Australia has increased (Table 1). While overall horticultural crop production in Aus-

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Table 1. Changes in apple production in Australia and New Zealand compared with other selected regions of the world. Data adapted from FAO figures (1).

	3-Year Means (1,000 MT)		
	74-76	83-85	Net Change
World	30,061	38,936	+30%
U.S.A.	3,112	3,699	+19%
South America	937	1,511	+61%
Republic of South Africa	395	446	+13%
Australia	326	303	- 7%
New Zealand	161	237	+47%

tralia has been increasing, apple production there has declined. Australian exports have declined due to the lack of an aggressive, centralized marketing organization, when compared to other southern hemisphere export districts. Australian apple production was relatively stable for 25 years after the end of World War II, but it began declining in 1971. Exports from Tasmania have been declining since the mid-1960's (4).

Major Southern Hemisphere areas expanding their apple production are South America, New Zealand and the Republic of South Africa (Table 1). The success of export apple production in South Africa and New Zealand during the 1960's and 1970's may have spurred planting and production in South American countries.

Horticultural exports from New Zealand totalled nearly one billion (NZ) dollars in 1988 (5). Kiwifruit represents the major horticultural export crop. The success of kiwifruit, a decline in pastoral agriculture, and favorable returns for apple growers have stimulated a general increase in horticultural crop production in New Zealand. Mean apple production has increased 47% during the past decade. Production is projected to increase an additional 80% in the next 5 years to 550 MT (6).

Cultivar Changes in New Zealand

Total New Zealand apple production in 1985-1986, was estimated to be 15,642,100 cartons. Apples were planted on 7,226 ha (17,850 acres), giving a mean yield of 39.4 MT/ha for New Zealand (about 875 cartons per acre). 'Granny Smith' continues to be the primary cultivar grown in New Zealand, while 'Cox's Orange Pippin,' 'Delicious' and 'Golden Delicious' are grown widely (Table 3). To penetrate the U.S. market, poorly-colored strains of 'Delicious' were replaced by plantings of 'Redchief' and 'Oregon Spur Delicious.' However, the world-wide overproduction of 'Delicious,' and declining prices have stimulated rapid planting and production of other new cultivars. The New Zealand Apple and Pear Board prices for apple export are indicative of the future direction of their industry. Prices received for 'Braeburn,' 'Fuji' and 'Gala' are significantly higher than those offered for traditional cultivars (Table 4).

The impact of high prices and the profitability of the apple industry is having a significant impact in the Marlborough district. Marlborough is a rapidly expanding area, east of Nelson on the South Island. It is estimated that hundreds of new apple growers in that region have established commercial-scale plantings. About 1000 ha (2471 acres) of young, non-bearing orchards

Table 2. Annual value of New Zealand horticultural exports in the 1986-1987 season. Data adapted from Halstead (5).

Fresh Fruit	NZ $595,037,076
Kiwifruit	(423,506,613)
Apples	(126,032,968)
Processed Fruit	62,564,113
Fresh Vegetables	60,915,745
Processed Vegetables	52,723,121
Plants, Cut Flowers	29, 259,651
Total Horticulture Exports	NZ $800,499,706

Table 3. Volume of apples marketed by the New Zealand Apple and Pear Marketing Board during the 1985-1986 season. Figures adapted from reference 2.

Cultivar	Thousands of cartons marketed[z]			
	Hawke's Bay	Nelson	Others	Total
Granny Smith	3,124.7	1,593.1	748.3	5,466.1
Delicious	2,483.7	964.3	469.4	3,917.4
Cox's Orange Pippin	241.0	852.3	166.9	1,260.2
Golden Delicious	156.2	608.1	245.2	1,009.5
Gala	524.9	152.1	93.9	770.9
Sturmer Pippin	90.0	458.1	210.3	758.4
Other	1,166.9	880.6	412.1	2,459.6
Total	7,787.4	5,508.6	2,346.1	15,642.1

[z]One carton = 18.2 kg (40.13 lbs.)

existed there in 1988 (6). In that year alone, 220 ha (544 acres) were planted in Marlborough. 'Braeburn' (23%), spur 'Delicious' (17%), and 'Fuji' (16%) trees predominated. Production of 'Sturmer Pippin,' a processing cultivar grown in Nelson is declining rapidly, as is the production of 'Golden Delicious.' Trees of poor-quality strains of 'Delicious,' and 'Gala' trees infected with russet-ring virus were also being removed in 1988.

'Gala' has been popular and profitable as an early-season export crop. Originally propagated as a yellow apple with a strawberry blushed cheek, 'Gala' is now exhibited as one of numerous red sports being propagated (3). Few New Zealand growers now plant the original cultivar, and standard 'Gala' trees are found in older orchards only. 'Royal Gala,' a striped clone is favored in new plantings. Fruit color variability and reversion in 'Royal Gala' and 'Imperial Gala' trees has sparked interest in 'Regal Gala,' a stable, blushed clone.

Implications for the Future

The New Zealand industry is based on controlled production, good quality and orderly marketing. The success New Zealand has enjoyed in apple exports has spurred planting and production of New Zealand cultivars in other countries. To maintain their marketing lead, New Zealand growers are shifting cultivars rapidly. While growers in the Americas and Europe are now discovering 'Gala,' New Zealand growers have planted red-Gala clones heavily. The industry there is testing new cultivars and strains to replace 'Gala.'

A highly-colored, striped and blushing clone, 'Galaxy,' was recently identified and patented. This may be planted widely in the 1990's. Another early season cultivar, 'Sansa,' is being tested as a potential replacement for 'Gala' (D. McKenzie, personal communication). While 'Gala' and 'Braeburn' loom on the immediate horizon, no doubt other new cultivars will be forthcoming as the NZ Department of Scientific and Industrial Research sustains one of the

Table 4. Estimated minimum wholesale prices paid to NZ apple growers for New Zealand apples by the New Zealand Apple and Pear Marketing Board in February, 1988.

Cultivar	F.O.B. Price per Packed Box	
	100-113 count	125-138 count
Braeburn	US $8.53	US $8.35
Fuji	8.53	7.67
Gala	7.38	6.79
Royal Gala, Regal Gala	7.38	6.79
Cox's Orange Pippin	6.12	6.61
Granny Smith	4.70	4.25
Red Delicious	4.02	3.83
Golden Delicious	3.94	3.60
Richared	2.35	2.47

few apple breeding programs left in the world.

'Delicious' is declining in worldwide popularity. However, it is interesting to note that many of the newer cultivars gaining prominence in New Zealand have 'Delicious' in their background. 'Fuji' ('Ralls Janet' x 'Delicious') and 'Gala' ['Kidds Orange Red' ('Cox's Orange Pippin' x 'Delicious') x 'Golden Delicious'] have 'Delicious' in their parentage. A widely-planted North American cultivar, 'Empire' ('McIntosh' x 'Delicious'), also is a 'Delicious' hybrid. The rise in popularity of cultivars with 'Delicious' in their background suggests that it should be considered in future apple breeding efforts.

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Fruit Varieties Journal 45(2):79-83 1991

Current Situation and Future Trends in Apple Cultivars in the Pacific Northwest

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Abstract

Between 1978 and 1985, the percentage of trees planted which were varieties other than 'Delicious' rose gradually from about 20% to over 40%. In 1985, the acres devoted to varieties other than 'Delicious' was less than 25% of the total. The principal other varieties were 'Golden Delicious,' 'Newtown,' 'Granny Smith,' 'Rome Beauty,' 'Winesap,' and "others." The acreage of those "others" totaled less than 'Rome' acreage, and was quite minor. Those other varieties were: 'Jonathan,' 'Akane,' and still "others." Two new varieties, 'Gala' and 'Fuji,' are especially in demand. Planting of 'Jonagold' appears to have peaked and is declining. 'Jonagold' is apparently too sensitive to sunburn and breakdown in hot weather.

Introduction

For more than two decades, Washington State University has conducted a small-scale apple variety trial at Mt. Vernon, on the West Coast, far from the main apple production district. After seeing the high quality of 'Jonagold,' 'Spartan,' and other new varieties in these trial plots, growers planted numerous small orchards west of the Cascades.

In 1980, a systematic trial of 30 mutant strains of 'Delicious' was begun in Washington and Oregon. Although smaller, less complete collections of strains of 'Delicious' had been studied in earlier years, these replicated trials, which were undertaken using trees propagated on two rootstocks at a single nursery, represented the first thorough attempt to investigate differences quantitatively as well as qualitatively.

In 1984-85, a study of apple varieties, advanced selections, and mutant strains was started by Oregon State University at Corvallis. In 1986-87, WSU began

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