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The Necessity of Adopting New Apple Varieties to Meet Consumer Needs

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Presented as the Robert F. Carlson Lecture at the 42nd Annual IDFTA Conference, Hamilton, Ontario, Canada, February 20-24, 1999.

We must accept the fact that older apple varieties such as Delicious and McIntosh are obsolete. Products in greater demand and of more value must replace obsolete products for producers to survive. Promoting obsolete products does not improve product value. To the consumer internal fruit quality is more important than appearance. Paying producers for appearance, red color and large size is counterproductive. Expecting apples from 10 to 12-month CA storage to have optimal quality is unrealistic and ignores consumer needs. Inventing new products—varieties, in the case of apples—is essential to keep ahead of the competition.

The products of the apple industry are varieties. Consumers recognize apple varieties and buy them by name. Varieties are the focal point of change in the apple world and a variety change impacts growing, handling and marketing. However, there must be a reason to change apple varieties. The consumer is the reason to change.

Part 1. Apple Varieties, the Focus of Change

With apples, unlike other fruits, the variety itself is important when the consumer makes a purchase. The consumer has a choice of varieties and usually knows the varieties by name, appearance and eating quality. In the apple business the focus of change is the variety. Because change is occurring so quickly in all aspects of society, it is important to adapt and to build change into every business. Change is certainly occurring in the way we produce, handle, market and sell apples. Consumer preferences are changing and the choice of apple varieties offered to the consumer has changed. It is necessary to accept that change will occur and that it will occur more and more quickly.

Building Change into Your Orchard Business

There are important reasons to build change into your orchard business and into our apple industry:

- Accepting the status quo means a decrease in the value of a variety because new varieties become available.
- Customers demand improved products and, if we do not supply the new varieties, someone else will.
- If the product we provide is obsolete, we will be denied access to capital.

There are many examples of orchardists who built change into their businesses. Space allows mention of just two. “Mr. Change” in the Washington fruit industry would certainly be Grady

Auvil of Orondo. Grady Auvil passed away at 93 in late December 1998. He was the first to plant commercial acreages of Granny Smith, Gala and Fuji. To take advantage of the high, early prices for these varieties, he planted at high densities in double rows on dwarfing M.26 and M.9 rootstocks. He changed the canopy structure from vertical to angled to improve light penetration into the center of the canopy. He planted Granny Smith at high densities with dwarfing rootstocks almost 10 years before others in the Washington industry started planting high density orchards with Gala and Fuji in the late ’80s. He recognized the importance of getting into production quickly. Grady Auvil was also the first to commercialize Rainier cherries. He did so because of the very high quality (size, appearance, firmness and sweetness) of the product. His motivation for change to Gala, Fuji and Rainier cherries was to supply the consumer with a very pleasing eating experience. More about the importance of the consumer later.

An example of a family orchard that continues to build change into its business plan is the family of Doyle and Thyra Fleming and son Tye, also of Orondo, Washington. They were among the earliest to plant Granny Smith, Gala, Braeburn and Cameo. They have changed to more dwarfing rootstocks and planted at higher and higher tree densities. Doyle enjoys saying, “I have never planted the same system twice.”

Are Some Apple Varieties Obsolete?

If any product (including an apple variety) is old, mature, old-fashioned, less in use or no longer current, and it receives a low price, it is obsolete.

My belief is that many fruit districts around the world are growing obsolete apple varieties. In many cases, they do not know it. In other cases, they are in denial. They still believe in the cash cow, even though the cow is going dry and is headed for the slaughterhouse. McIntosh in Canada and the northeastern U.S., green-fruited Golden Delicious in Europe, Jonathan in the midwestern U.S. and Red Delicious in Washington and throughout North America are examples of obsolete varieties.

With obsolete varieties we cut prices to keep market share. Cutting prices is not a measure of competition. It reflects obsolescence. It means there is a better, improved and more valuable product in the marketplace. With every cut in price, the life expectancy of a product diminishes. These observations clearly apply to McIntosh and Red Delicious.

Apple Variety Life Cycles

An apple variety goes through a predictable life cycle. It begins with invention (breeding) or discovery (chance seedlings, mutations) and proceeds through introduction, emergence (increasing plantings), extensive production and eventually to obsolescence and paralysis (Figure 1). The speed at which varieties move through these stages varies. Today advancement through the stages is more rapid than in the past. Some new varieties never advance from the invention to the introduction stage, and many falter during the emergence phase. Today Pink Lady® Cripps Pink cv., Cameo and Honeycrisp are emerging varieties in North America. Varieties which have passed through obsolescence are Stayman and Winesap.

Red Delicious, Golden Delicious and Granny Smith have taken over 50 years from their discovery to commercialization (Table 1). More recent varieties such as Braeburn, Empire, Jonagold, Gala and Fuji have taken 20 to 30 years from introduction to commercialization. The newest introductions, Pink Lady® Cripps Pink cv., Pacific Rose and Cameo, have taken

approximately 10 years from their introduction to commercialization. Since change in varieties occurs so rapidly today, it is imperative that orchardists make every effort to become knowledgeable about new introductions.

Table 1. The approximate number of years it has taken for varieties to advance from their discovery or invention to commercialization.

Variety[z]	Years to commercialization
Delicious	Over 50
Golden Delicious	Over 50
Granny Smith	Over 50
Braeburn (1952)	30 (in New Zealand)
Gala (1960)	20 (in New Zealand)
Fuji (1962)	20 (in Japan)
Empire (1966)	25
Jonagold (1968)	20 (in Europe)
Pink Lady® Cripps Pink cv. (1985)	10
Pacific Rose (1990s)	10
Cameo (1992)	?

[z]year of introduction in brackets.

Varieties have a price cycle that reflects the stages in their life cycle (Figure 2). All varieties have increasing prices when demand outstrips supply. This occurs from the time there is interest in a new variety until it emerges as a commercial variety. At some point when supply exceeds demand, prices begin to decline. Eventually as prices continue to decline in comparison with other varieties and newly introduced varieties, the older variety becomes obsolete. Price determines the length of time a variety remains at a particular life cycle stage. Declining prices indicate extensive production of a variety and low prices are a measure of product maturity and obsolescence.

Developing New Varieties

Inventing new varieties with traditional breeding programs may take 20 to 30 years. From the introduction through the emergence phase may take an additional 10 years. If we wait until a commercial variety is obsolete before beginning the task of inventing new varieties with plant breeding, we will be too late to have new varieties in time to replace the obsolete products. It is necessary to begin the reinvention process of breeding new varieties before the existing varieties are extensively planted (Figure 1).

Washington State University began an apple breeding program in 1994. It will not introduce new cultivars in time to replace the Delicious variety. Fortunately, Gala, Fuji, Braeburn, Pink Lady® Cripps Pink cv. and Cameo have become commercial varieties that should be profitable for a decade or more, forestalling the need for new replacement varieties until perhaps 2010. It will still be necessary after 2010 for other new varieties from around the world to fill the gap before new varieties are available from the Washington breeding program.

As noted above, the life cycle of new varieties will be compressed into fewer years than with older varieties. This puts added pressure on breeding programs to quickly introduce new varieties.

The objectives and the approach of the WSU Apple Breeding Program differ from many other programs. The goal is to produce unique varieties, not varieties that are improvements of existing varieties. Breeding programs in Canada and the eastern U.S. have had the goal of developing an improved McIntosh. In England, a goal was to produce an improved Cox's Orange Pippin. Empire and Spartan, improved McIntosh types, and Fiesta, an improved Cox's Orange Pippin, have not become major varieties because most consumers cannot easily differentiate them from their older counterparts. It has also not been possible to obtain a significant increase in price or to increase shelf space because the older varieties, which look fairly similar, are already in the supermarket produce sections.

If we look at the rate of increase in production of newer varieties, we see that Empire has shown only a modest increase during its emergence phase in comparison with the truly unique varieties Granny Smith, Gala and Fuji (Figure 3). Certainly other factors are involved in the acceptance of a new variety, including variety adaptation to the region and fruit characteristics such as texture, juiciness and regional flavor preferences. However, because consumers use appearance, for the most part, to distinguish varieties, uniqueness is a very important factor.

Gala, in its original striped, bicolor form, was unique in appearance and in taste, texture and juiciness when compared with the older unicolor red, yellow and green varieties which dominated the marketplace. Pink Lady® Cripps Pink cv. is also a unique variety with a pink blush over yellow background color, a relatively dry and firm texture and tart flavor. These new varieties have created their own shelf space due to their uniqueness and to increasing consumer demand for unique products. They have been easy for the consumer to differentiate and have received improved prices.

Variety Adaptation

A goal of the WSU Apple Breeding Program is to introduce unique varieties adapted to the dry and hot summer climate of central Washington. What does "adapted" mean? The fruit of an adapted variety reaches optimal internal quality (firmness, juiciness, sweetness and flavor) at the same time it has maximum external quality (color, freedom from waxiness and cracking). An example of a variety which is not adapted to the climate of central California is Fuji. It reaches its optimal internal quality and must be picked long before it reaches acceptable red skin color. McIntosh and Jonagold, when grown in central Washington, have similar problems. On the other hand, in central Washington, Golden Delicious generally has optimal internal quality and good external appearance (a golden not green color) at approximately the same time in the fall. The original Delicious variety had optimal internal quality and reasonably good color at the same time. However, today we expect more red color. The advent of redder and earlier coloring strains improved its adaptation and, in fact, lengthened its life cycle. Ideal color is not achieved every year at the time fruit is ready for harvest based on its internal quality factors (starch, soluble solids and firmness). Not all seasons are similar in accumulating the heat units required to achieve optimal internal quality or in the time cool temperatures occur in the fall to enhance red color development. In all fruit districts ideal conditions for synchronizing internal and external quality usually occur near the end of the growing season. This is the time when temperatures fall and color development occurs. It is clear that Red Delicious and Golden

Delicious are much better adapted to the central Washington climate in most years than Fuji is to the California climate every year.

Part 2. Consumers, the Reason to Change

The objective of a variety development program should be to meet the needs of consumers, particularly their future needs.

Without a doubt, consumers want apples with better quality. If the eating experience is unpleasant, which usually means mushy, dry and without flavor, the consumer might not try that variety again or might not try any apple again. The consumer also wants a variety that can be kept outside the refrigerator for a week or more without serious deterioration in quality. After all, it is beautiful to see a bowl of apples on the table but disappointing if they are not fit to eat. Better shelf life will clearly improve the eating experience.

The consumer wants a uniform product of high quality the year-round. Is it possible to store an apple for 10 to 12 months in CA without significant deterioration in quality? Because fruit for long-term CA storage is picked on the early side, it has less than ideal quality going into storage. It is asking too much of most if not all varieties to provide a pleasant eating experience after 10 to 12 months in storage. Consider apples in supermarkets in July in the northern hemisphere. Four-month-old Braeburn, Granny Smith and Fuji apples from the southern hemisphere will usually provide a superior eating experience to 10-month-old apples of the same varieties from the northern hemisphere. Gala is an apple that cannot be stored more than 6 months without a loss in quality. However, we try to market Gala 7 and 8 months out of storage. This practice will not provide consumers with a pleasant eating experience and will eventually lessen demand for the variety. In the northern hemisphere in April and May, a 2-month-old Gala fruit from the southern hemisphere clearly surpasses in flavor, texture and juiciness an 8-month-old Gala fruit from the northern hemisphere. If northern hemisphere producers are to consider the customers' interests first, it may be appropriate to become southern hemisphere producers as well, global farming, to provide fresher products of uniform quality year-round.

Consumers do not usually know or think about how old an apple is or when an apple was picked. They may know an apple is from Chile or New Zealand in the southern hemisphere. However, they usually do not think about the fact that these southern hemisphere apples are fresher and than northern hemisphere apples in the same food market are 6 months older. But if they did know an apple were 8, 10, or even 12 months old, would they purchase it? I do not think so. This realization by consumers that apples in the marketplace are old (not fresh) could be a potential public relations nightmare for apple industries which rely on long-term CA storage.

The consumer is demanding greater and greater choice in products. This is true for clothing, cars, TVs, and all products, including apples. It is clear that consumers have enjoyed the opportunity to purchase and eat bicolor apples such as Fuji, Gala and Braeburn not just because of their distinctive coloring but also because of their unique flavors, juiciness and textures. To not provide a choice for consumers with updated varieties is to accept the status quo. Accepting the status quo allows someone else to introduce a new variety and push your variety from the store shelves.

The apple consumer seems less concerned with appearance today than in the past. The acceptance of Fuji and Braeburn, which generally are not considered attractive varieties,

indicates that consumers are becoming more concerned with internal quality than external appearance. This trend will be confirmed if there is widespread acceptance of the new Cameo variety. To meet consumers' needs, breeders must select for internal quality first and external appearance second.

In the future, there will be greater demand for apples with higher levels of nutrients and vitamins such as Vitamin C. Sliced apples can, much like cut-up lettuce, be packaged for sale in supermarkets. Apples for this use will carry the non-browning genes.

It will clearly be necessary to move from product security, comfortable production of cash cow varieties like McIntosh and Delicious, to product adaptability, challenging production of new varieties having superior quality that will meet the future needs of consumers.

Refocus on Varieties for the Consumer

When orchardists consider planting Delicious and McIntosh, the discussion often includes the justification "if it ain't broken, don't fix it." However, if there are new varieties available in the marketplace and they receive a higher price, "it is broken." We just do not know it.

Today with our existing varieties we endeavor to sell what we produce. Growers, handlers, and sellers choose the product. However, we should be producing what sells. Consumer preference should be the major reason for selecting and producing the product. Remember why Grady Auvil started producing Rainier cherries, because he knew the consumer would enjoy its very high quality.

How easy a variety is to grow, handle, store and transport is not as important as the consumers' desire to buy the variety. It is a consumer who really wants a new variety that is willing to pay a fair price or even a high price for that variety.

Accept Change as Your Friend

In every business, it is clearly inappropriate and in many cases suicidal to accept the status quo. A competitor will certainly develop and produce a new product that will erode your shelf space and cause you to reduce your price. The only sure way to survive is to build change into your business.

Two apple growers, cousins Mr. I. Change and Mr. Y. Change, were discussing whether or not to plant a new block of Delicious.

Mr. I. Change said enthusiastically, "I am going to plant one of the new varieties, maybe Fuji or Gala or even Cameo."

Mr. Y. Change said, "No way, change is too risky. I'm going to plant Red Delicious."

"Why?" asked his cousin.

"Because we grow Delicious better than anyone else," said Y. Change.

I. Change agreed. "That's right. We do grow the best Delicious in the world, but that's the wrong reason for planting Delicious."

Y. Change did not understand, so his cousin explained: "From the consumers' viewpoint, eating the best Delicious isn't as good as the eating experience of a Fuji or Gala."

Getting defensive, Y. Change said, "Yes, but our Delicious look the best in the supermarket."

His cousin, by now quite frustrated, said, "Being the best at producing a product and having the most attractive product does not mean the product is in demand." He continued, "Just ask IBM about its mainframe computers. IBM did produce the best mainframe computers but customers were asking for networks of powerful PCs."

Y. Change reflected for a moment and reluctantly said, "You have a point there, cuz, maybe I should plant Gala." He paused and, with a grin, said, "Mrs. Y. Change asked me to bring some apples home, but specified any variety but Delicious!"

Fruit Quality and the Consumer

Orchardists in Washington are paid on the basis of fruit size and color with higher returns for the largest and reddest apples. Does this reward structure ensure that the consumer receives fruit of the highest quality? Does this emphasis on external appearance influence what the consumer really wants, high internal quality? The emphasis on red color and size does influence internal quality. Clearly, it reduces internal quality. By waiting for red color development, fruit is often overmature when harvested. Out of storage the largest apples usually have the lowest firmness. By changing to early and high coloring strains to achieve high packouts, immature fruit is often harvested. In addition, many believe the highly colored strains planted today to improve packouts have inferior quality. Is red color really so important if striving for it reduces fruit quality?

Would it not be sensible to reward growers for the fruit characteristics that create consumer demand? To match product quality with consumer preferences would require paying a premium to growers for internal quality factors such as crispness, juiciness, soluble solids and flavor. Remember, consumers may buy with their eyes, but quality makes them a repeat customer. Consumers are also willing to pay higher prices for high quality products.

Focus on Change

Short-term thinking is easy. You give it very little thought and plant old varieties that you are comfortable with or varieties that others have introduced. Long-term solutions are more difficult. Inventing and producing a new product takes time and is challenging. However, the rewards, particularly with the promotion of a new product, can be outstanding.

We must move from the edge of disaster, where some think the Washington apple industry is today, to the cutting edge. This means eliminating as quickly as possible obsolete varieties and inventing and producing new, unique products.

We often strive to be competitive by growing varieties that other countries or states introduce and produce. We are followers. We planted Fuji, Gala and Braeburn because the New Zealand apple industry produced them and, by promoting the new varieties, developed a market. To be competitive should not be our goal, it should be to eliminate competition. You eliminate competition by producing something else, something new. Introducing and producing something new, as the New Zealand apple industry has done, eliminated early competition and, as a result,

they received a significant price premium. If being competitive is the goal, mediocre to declining prices will be the best you will receive.

We can react to change by following others, planting their varieties, and accepting average prices, or we can initiate change by inventing new products and raising prices.

Is it wise to promote an obsolete variety? Should the Washington apple industry, through the Washington Apple Commission, be promoting Delicious? Is it prudent to promote a product with less and less value? We must ask if this cheerleader approach is effective at improving value for the producer of obsolete varieties. On the other hand, the visionary approach would be to promote new products with the opportunity to improve product value. The New Zealand apple industry created markets for its new varieties through promotion.

Many orchardists in Washington recognized the problems of producing too many Delicious apples after the crisis years of 1987-89. The questions asked at the time were, was the problem of low prices due to overproduction, undermarketing or consumer dissatisfaction with the product? It was generally thought (incorrectly, as we know now) that overproduction was the culprit.

Some Delicious acreage in Washington was removed and replanted to new varieties. New varieties were also planted on new land. The rapid rise in the ’90s of Fuji and Gala production was the result (Figure 3). However, production of Delicious has not declined in the decade since the crisis. In fact, it has increased by over 10% even though, as a percentage of total production of all varieties, it has declined (Figure 4). The problem did not go away and has resurfaced in the late ’90s. Perhaps this time we will recognize the problem for what it is, a product that is obsolete. The current crisis will certainly result in the removal of older Delicious orchards. However, because of the high productivity of newer Delicious orchards, Delicious production may not decline in the next decade.

Orchardists who built change into their businesses after the 1987-89 crisis are today in a much better position to survive the crisis of the late ’90s than growers who accepted the status quo a decade ago. The future of any apple industry depends on accepting that change is inevitable, that it will occur at a faster and faster pace, and that building change into our industry is the only avenue to survival and prosperity.

For an interesting look at change with technology products, I encourage you to read *Technotrends* by Daniel Burrus (1993, HarperBusiness). Although the principles of change are discussed for technology products, they apply to products in all industries, even the apple industries and our products, apple varieties.

In summary, successful orchardists build change into their businesses. Replacing old varieties with new ones and modernizing management practices are necessary ways growers must change. Successful industries also change. The reason to change is to meet consumer needs. Industries can hike prices if they reinvent their products. Industries which have increasing value in their products prosper. Industries must continually invent new products or they will certainly fail as others pass them with new products. An industry which embraces the invention of new products is an industry that makes change its friend.

Additional Reading

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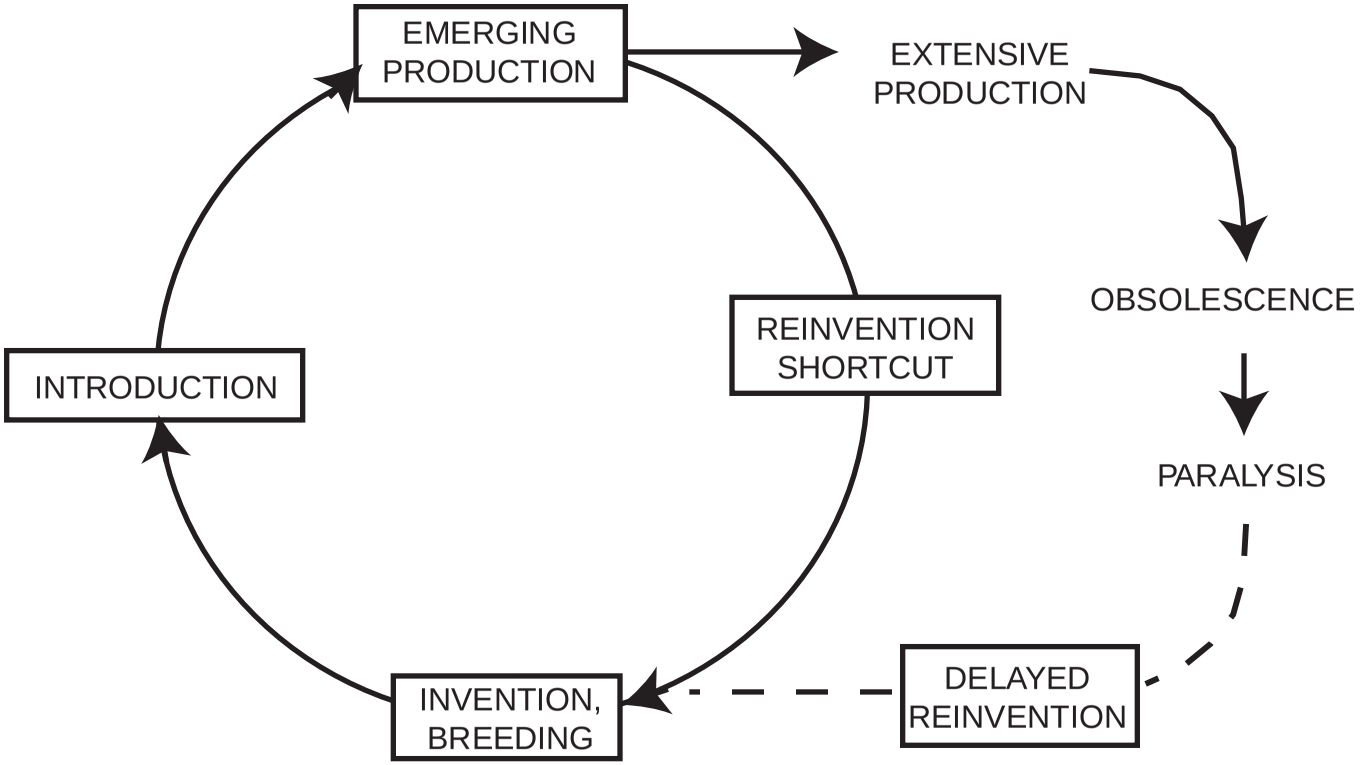

Figure 1. The apple variety life cycle.

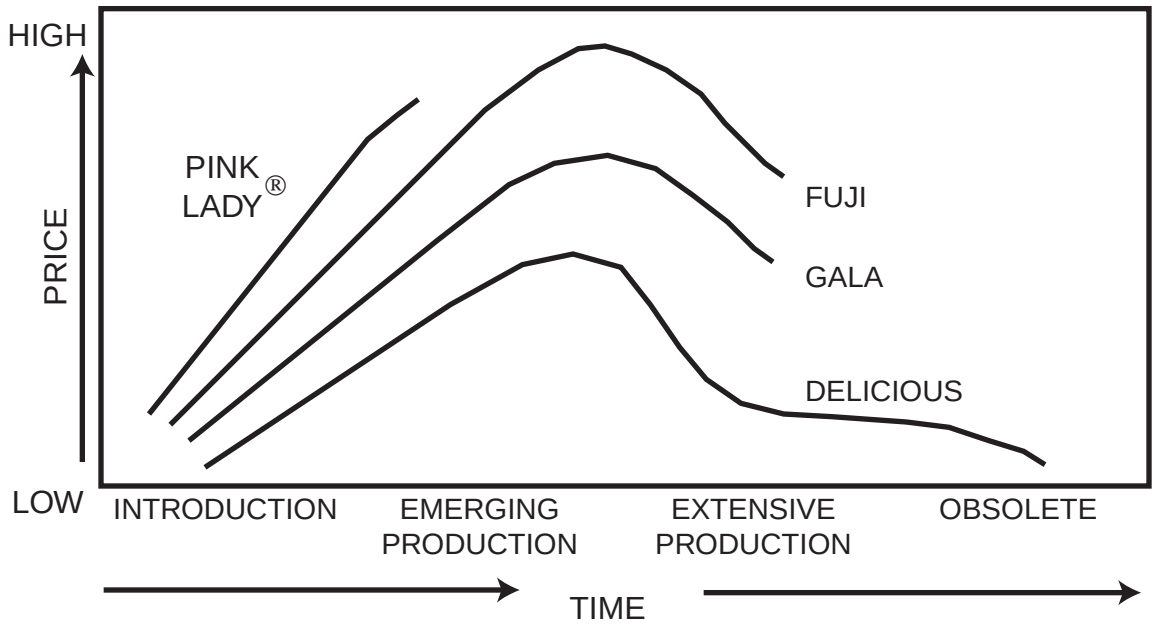

Figure 2. The apple variety price cycle showing the position of four varieties in the late 1990s.

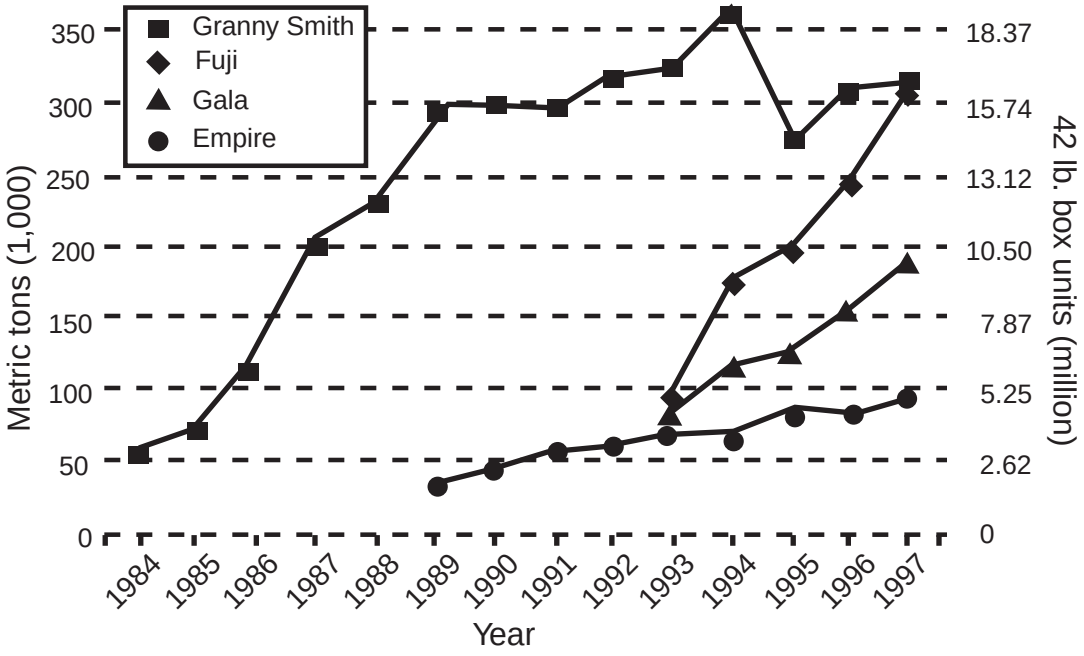

Figure 3. U.S. production for newer apple varieties.

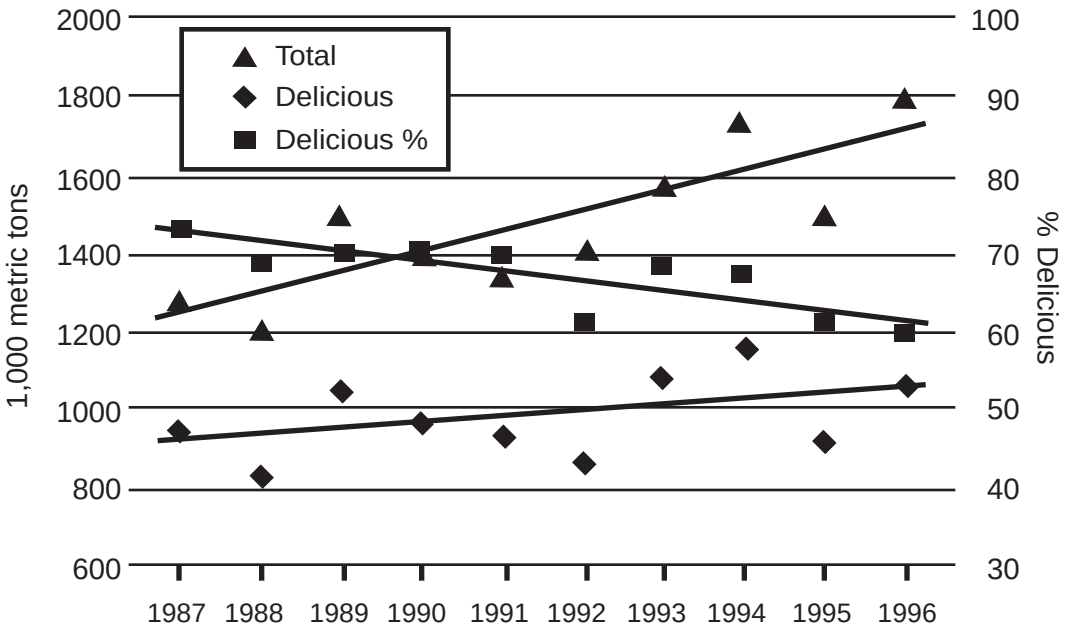

Figure 4. In the decade from 1987 to 1996, total apple production in Washington increased dramatically while Delicious production increased modestly. However, as a percentage of total Washington production, Delicious has declined.