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This article explores connections between the “domestication” of apples in Southern Brazil, the polemic on contaminated apples in 1989, and the reactions of the apple industry to the news published in the press on the use of pesticides in Brazilian orchards. The issue is viewed in the wider context of notions of toxicity and “danger”, nature control, correction of nature, and temperate climate agriculture in Brazil, which have become very influential both in the public consciousness and in individual awareness, in connection with aspirations to healthier and safer food. The article states that apple producers’ responses to the issue can be much better understood through a historical examination of the agroecology of the apple monoculture, as well as the structures, agents, and discourses informing perceptions of the environment in apple-producing regions.

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Artificial Apple Production in Fraiburgo, Brazil, 1958-1989*

Jó Klanovicz

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he expansion of modern commercial apple planting (*Malus domestica* Borkh) in Southern Brazil occurred from 1962 onward in the city of Fraiburgo, in the Midwest of the state of Santa Catarina. The orchards were planted on areas previously covered with Ombrophilous Mixed Forest (OMF), mainly composed of Araucaria pine trees (*Araucaria angustifolia*).¹ Southern Brazil, as a typical agricultural bor-



der area, participated in the national and international economies as a supplier of timber between the end of the nineteenth and the first half of the twentieth century. In the second half of the twentieth century, intensive agriculture caused the disappearance of a vast ecosystem that was peculiar to this part of the world.²

In the late 1950s, timber businesspeople from mid-western Santa Catarina, conscious of the shrinking of timber forests, used their personal connections with state and federal public organs to retain their position as members of the economic and social elite in this region.³

* The present paper incorporates parts of my earlier article “Discursos técnicos sobre a produção de maçãs no sul do Brasil”, co-authored with Eunice Sueli Nodari and published in *Interthesis*, 7, 1, 2010, pp.117-144, as well as some discussions at a session of the Simpósio de La Sociedad Latinoamericana y Caribeña de Historia Ambiental, held in La Paz, Mexico June 2010. Thanks to Regina Horta Duarte, Eunice Sueli Nodari and José Augusto Drummond.

¹ The Mixed Ombrophilous Forest is part of the Brazilian Atlantic Forest biome and gave the highest timber yields in Southern Brazil between the end of the 19th century and the 1960s. Of the 200,000 km² of forest spread throughout the southern states of the country, Santa Catarina held approximately 50,000 km². About 25 to 37 millions of Araucaria pine trees (with trunk diameters of 40 cm or more) were harvested from 1910 to 1940 in the mid-western district of the state alone. In March 2010, the project “Dominated Nature: Occupation and Deforestation of the States of Western Santa Catarina and Rio Grande do Sul (1875-1970)” was initiated, under the coordination of Eunice Sueli Nodari, PhD, in collaboration with the Laboratory of Immigration, Migration, and Environmental History of the Universidade Federal de Santa Catarina, located in Florianópolis, Brazil. The project focuses on the relationship between immigration, migration, and deforestation of the Mixed Ombrophilous Forest.

² J. McNeill, “Woods and Warfare in World History”, in *Environmental History*, 9, 3, 2004, pp. 388-411.

³ Detailed studies on interpersonal relationships between members of private agro-industrial companies and governmental agents in connection with the modernization of agriculture in Southern Brazil were carried out, especially in the domain of Social and Human Sciences, after the 1990s. The interest drawn by this subject bears witness to its importance in the history of agricultural development in the region. See P.Z. May, *Redes político-empresariais de Santa Catarina (1961-1970)*, Universidade Federal de Santa Catarina, Florianópolis 1998. I.L. Michels, *Crítica ao modelo catarinense de desenvolvimento: do planejamento econômico (1956) aos precatórios (1997)*, Editora UFMS, Campo Grande 1998.

Orchard planting over areas formerly covered by native forests had emerged as a feasible option.⁴ Thus, in 1962 Fraiburgo became the first city to have a modern commercial apple orchard with French sprouts, in an area where agriculture was being strongly modernized by financial inputs, technical innovations, expansion of the cultivated surface, and the use of pesticides – the main factors in the modernization of agriculture in Brazil after World War II. Since Santa Catarina had a European-like climate with quite cold winters, some entrepreneurs had a vision of producing apples here. They succeeded, but only by creating artificial conditions for the crop. This gave rise to a series of discourses on “correcting nature” and practices adopted to this end, reflected in public and private documents written by professionals involved in the development of the apple orchards.

From 1962 to 2000, Fraiburgo became the largest apple producer of Brazil, freeing the country of its earlier dependence on imported Argentinean apples. During the 1980s, the apple orchards expanded over the remaining natural forests in the area. There were important ecological consequences, such as fungi and diseases attacking the roots and leaves in the new orchards. The only solution was to intensify the use of pesticides, and this gave rise to polemics. There was a heated debate nationwide in July 1989, when a load of apples was seized on the state border between Paraná and Sao Paulo, analyzed for toxicity, and found contaminated by dicofol (a cancerous miticide). The incident occurred just as apple production was consolidating in Brazil, and actually threatened national apples sales. The episode makes an interesting case-study for environmental and cultural historians, as well as economic historians.

In the present essay I examine the nationwide debate on the use of pesticides in apple orchards in southern Brazil, which began in July 1989 in the Brazilian press. I look at the methods employed by apple

E.M. Mussoi, “Políticas públicas para o rural em Santa Catarina: descontinuidades na continuidade”, in *Agricultura e espaço rural em Santa Catarina*, M.I.S. Paulino, W. Schmidt (eds), UFSC, Florianópolis 2003.

⁴ W. Frey, *Fraiburgo: berço da maçã brasileira*, Lítero-Técnica, Curitiba 1989. See also T.J. Burke, *Fraiburgo: do machado ao computador*, Vicentina, Curitiba 1994.

producers and their reaction to accusations, and set the whole issue within the broader framework of ideas on toxicity and food risk, which by 1989 had started to be featured in the press as the negative pendant to notions about the consumption of healthier foods and food safety.

I claim that the response of orchard producers to criticism can be best understood from the perspective of a historical interpretation of the agroecology of the apple monoculture in Fraiburgo, as well as the structures, agents, and discourses informing human relationships with the environment in the region. I base my argumentation - particularly as regards the discursive exploitation of the episode of the contaminated load in 1989 and its connection with the broader subject of notions of toxicity in history - on articles published in the journals *Veja*, *IstoÉ*, and *ExameVip*, and the newspapers *Gazeta Mercantil*, *O Globo*, and *Diário Catarinense*. These articles report the accusations of contamination and the reactions of Brazilian and Argentinean apple producers, and debate the risks of consuming allegedly healthy food supplied by a high-tech agriculture still making use of agrochemical products. I cross-checked these press documents with technical data on apple production in southern Brazil, as well as four semi-structured interviews with professional agronomy technicians who were directly involved in orchard planting at that time and handled chemicals such as dicofol, which in 1989 was legally banned in Brazil. The four interviewees are designated as Agronomy Technician #1, #2, #3, and #4: I have decided not to divulge their names to protect their professional lives in a context where the interpretation of the role of temperate-climate fruit production in the political and administrative history of Fraiburgo and the construction of a local identity fetishizing apple production are still an object of heated debate.⁵

The documentation I discuss here sheds light on the relationships between the public and private sector and how global policies (such as the prohibition of the use, production and sale of certain agrochemical products in the second half of the 1980 decade in Brazil) took on a historical role affecting the private life of individuals as

⁵ J. Klanovicz, E.S. Nodari, *Das araucárias às macieiras: transformação da paisagem em Fraiburgo/SC*, Insular, Florianópolis 2005.

well as the smaller and larger business spheres of apple production in Southern Brazil. The debate, focusing on the relationship between human beings and nature, was especially intense at scales as small as that of a single orchard or single apple production project, and this broad discussion generated a vast ripple effect.

I regard oral reports as a peculiar form of historical production, because I think of history as a knowledge field based on the memory of an individual or social group, and memory as the conscious act of remembering or forgetting, of updating and representing the past. In recording the reports of the four technicians presented here and cross-referencing them with documents reflecting public opinion nation and region-wide, I had to deal with the issue of memory types, of what the interviewees were willing to share publicly. Therefore, I have analyzed all documents with the view of attempting to reconstruct a certain solidarity among apple producers, as related to the discourse about the economic identity of Fraiburgo as an agricultural center, even when the interviewees recognized the threat posed by the agrochemical substances they were using at the time.

I begin by draw up a timeline for the undertaking of fruit production projects in the temperate climate of Fraiburgo as part of the agriculture modernization of Southern Brazil in the second half of the 20th century. I also look at the tactics adopted to adapt the apple sprouts to the climate, particularly until 1989. Next, I discuss apprehensions and discussions about contaminated apples in the press, as well as the reactions of producers and the impact of the discourse on toxicity on Brazilian apple production.

Bien faire, et le faire savoir:

The growing of Brazilian apples with Algerian French technology

In 1986 Fraiburgo celebrated its first Applefest. The Brazilian association of apple producers, APBM (*Associação Brasileira dos Produtores de Maçã*), seized the opportunity to release the campaign “Brazilian apples: A successful sin”. This allusion to the forbidden apple eaten by Adam and Eve in the Judaic-Christian Garden of Eden was

intended as a stab at agriculture professionals who in the 1960s and 1970s had claimed that Brazil's edaphic and climatic characteristics did not allow large-scale apple production.⁶ The Applefest was never repeated, but both the public and the private spheres had invested in publicizing this victory of technical expertise, where farmers had proved themselves capable of producing temperate-climate fruit in natural, climatic and soil conditions judged inadequate for the purpose by many foreign reports published twenty years earlier.

The idea of producing apples in Fraiburgo had started taking shape in the late 1950s, when sawmill owners in the area formerly known as Butiá Verde had become aware that their forest reserves were close to depletion. This was the case for brothers René and Arnaldo Frey, who had been exploiting timber in the mid-western Santa Catarina state since the 1930s. As forests dwindled, they had begun seeking investment alternatives to retain their status as members of the economic and social elite of the region. Their sawmill, *René Frey & Irmão Ltda.*, located in Butiá Verde, employed more than one hundred people, and was surrounded by a village which in December 1961 became the town of Fraiburgo. The company also had branches in Rio de Janeiro and Sao Paulo, directed by the sons of both businessmen. In Sao Paulo, the Freys were selling Araucaria-pine wooden boxes to Schenk Winery, a company which put the financially troubled sawmill in touch with the French Algerian wine producers Mahler-Evrard, and eventually helped them to establish direct contact between 1959 and 1962.⁷

The Freys and Mahler-Evrard had converging interests. The former intended to relocate investment from exploitation to agriculture, the latter wished to invest in fruit and wine production in Brazil. The French Algerian business wanted to flee Algeria before the decolonization process deprived them of their investment there. They had the

⁶ Frey, *Fraiburgo: berço da maçã brasileira* cit. Burke, *Fraiburgo: do machado ao computador* cit. W. Schmidt, *O setor madeirense em Santa Catarina: formação e consolidação de um complexo agroindustrial*, Universidade Federal Rural do Rio de Janeiro, Rio de Janeiro 1990.

⁷ H. Evrard, *Entrevista concedida a Marlon Brandt*, Fraiburgo 13 dez. 2003.

know-how in grape and wine production (although not in temperate-climate fruit-growing in general), and the capital, and were well aware of business opportunities for fruit production in Brazil. The Freys owned 5000 ha of land in the Fraiburgo area and knew that the soil and climate of their lands was relatively suitable to produce fruit such as apples and grapes – but had no experience in planting. This convergence of interests led to a business partnership. The Freys were to invest 1000 ha in the planting of temperate fruit and grapes, while Mahler-Evrard would supply financial capital to the project.⁸

Although they did not grow apple orchards in Algeria, the Mahler-Evrard group was in contact with specialists in the field in France. They were aware of the *réunions pomologiques* that planter Georges Delbard had been organizing in Malicorne/France since 1958, after the establishment of an experimental orchard for temperate-climate fruit in that area, broadly publicized in the French, North-American, Soviet and Japanese presses.⁹ These scientific and business meetings eventually led to the International Pomological Conference held in Sion/Switzerland in October 1962, and the Meeting on Fruit Economics held in Paris on September 21, 1964. Contact with French Algerian fruit producers at the Algerian Pomological Conference in 1952 offered Delbard a fundamental opportunity to broaden his research, create his own experimental orchard, and study the adaptation of temperate plants to different climates. In 1960, Delbard himself stated¹⁰ that there was a “plantation fever in Algeria. Be it *pieds-noirs* or metropolitan, it seems necessary to stay in touch [with these fruit producers] to experiment with and synthesize knowledge on temperate climate fruit production in order to plan dynamic and rational action for the future.”

“Friends are worth more than money” – says a French proverb often repeated by Delbard when reporting his experience with the Santa Catarina apple orchards. Contact between the Mahler-Evrard group and the Pépinières Delbard company encouraged apple planting in

⁸ Ibid.

⁹ G. Delbard, *Jardinier du monde*, Hachette, Paris 1986, pp. 404-405.

¹⁰ Ibid., p. 410.

Fraiburgo following the foundation of a local agricultural society, Safrá S.A. (*Sociedade Agrícola Fraiburgo S.A.*) in 1962. *Pieds-noirs* Henri Evrard, Roland Mayer, and Roger Biau migrated to mid-western Santa Catarina state, where they took up technical and administrative positions in the new company. Biau became responsible for studying a 40-ha experimental orchard located 5 km away from central Fraiburgo. This was first planted in 1962 and began production in 1963. Shortly thereafter, Safrá S.A. began selling sprouts (of apple, pear, peach, plum, and prune), fruit (mainly grapes), and liquor (cognac, wine, and sparkling wine) in all the states of Central and Southern Brazil.¹¹

The next step in the development of the company was the bringing in of capital and technical knowledge from Delbard himself. A pomological meeting held on September 1, 1965, in Malicorne (France) put the businessman in direct contact with the *pied-noir* Evrard family, who discussed with him their project of planting vineyards and apple orchards in Fraiburgo. Delbard remembers their encounter as follows:

As interested as I was in the issue of the behavior of young orchards, and after coming to the knowledge that they had a pilot orchard in Brazil behaving abnormally, I immediately accepted their invitation to analyze and expand their orchard. The idea of exploring the fruit planting potential of the largest country in South America was enticing to me. I was promoted to a consultant in a country I had never set foot in before, and my reputation demanded immediate dedication to the study of its biogeography.¹²

The North American agriculture professionals who had affirmed the impossibility of temperate climate fruit production in a tropical country were proved wrong. Biau's experimental orchard had showed the potential of the transposition of French Algerian expertise in fruit planting in North Africa to Brazil. Delbard had been right:

The southernmost part of Brazil, the Pelotas region, is located at the same latitude as Marrakech. The same causes produce the same effects, and my experience in Northern Africa as regards temperate climate fruit planting is a

¹¹ Burke, *Fraiburgo: do machado ao computador* cit., pp. 28-29.

¹² Delbard, *Jardinier du monde* cit., p. 569.

solid foundation to bring to this country a new application for my judicious theories. My spontaneous thoughts had turned out to be exact.¹³

In his first visit to Biau's experimental orchard in 1966, Delbard concluded that the behavior of apple and pear trees planted there was identical to that of those planted in Algeria, and that "altitude corrects the effects of latitude".¹⁴ He brought new varieties to Fraiburgo, suggested soil and landscape management techniques, and contributed to the expansion of Safra S.A. with capital investments until the 1970s, when he decided to quit the partnership.

The initial expansion of temperate climate fruit orchards in the state, between 1963 and 1973, saw the converging of private (until 1968) and public investments. For example, Federal Act 5,106, issued on September 2, 1966, authorized individuals and businesses to discount income taxes "up to 50% of tax value due to proved investment in foresting and re-foresting, which may be done by planting forest, fruit, or large scale trees within the fiscal year".¹⁵ The act's second comma reads:

1) forestation or re-forestation can only be performed by individuals or businesses who possess land through property titles [or] rights of use [...] 2) who have Ministry-of-Agriculture-approved projects envisaging the annual planting of 10,000 trees [...] 3) [...] forestation or re-forestation can serve as a basis for economic exploitation or soil and water conservation, subject to approval by the Ministry.¹⁶

According to this law, forestation and re-forestation expenses would be "those sustained by the contributor, directly or through his hiring of third-party services, for the drawing up of a technical project, land preparation, procuring seed, planting, protection, surveillance, and management of forests and greenhouses, as well as in the opening and conservation of service pathways."¹⁷

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Federal Bill #5.106, Brazil 2 September 1966.

¹⁶ Ibid.

¹⁷ Ibid.

Between 1967 and 1975, this law was widely exploited by the private sector. The planting of 10,000 orchards or more - which, taking into consideration such ecological problems as the falling off of flowers and very low per plant yields until 1975, must have extended over at least 10 ha - would not have been possible without the fiscal incentives provided by the federal government. Since 1969, technicians had noticed that measures were required to cope with flower loss between September and October, which reduced yields to 2-4 tons per hectare.¹⁸ At that time, the problem in producing temperate-climate fruit in the area lay in the edaphic and climatic incompatibility between Fraiburgo and the apple varieties produced in the area, which were still under soil and climate adaptation research. Several companies went to Fraiburgo with large-scale projects, taking advantage of the fiscal incentives to re-forestation offered by the military government. Such was the case for Reflor Ltda. (*Reflorestamento Fraiburgo Ltda.*), founded by René Frey and his eldest son Willy in 1967 mainly to plant *Pinus elliottis*, but later also *Mallus domestica*, with the authorization of the IBDF, the Brazilian institute of forest development (*Instituto Brasileiro de Desenvolvimento Florestal*).¹⁹

The main public investment instrument for temperate climate fruit planting in Fraiburgo in its early stages was a program called Profit (*Programa de Fruticultura de Clima Temperado*), set up by the state's autonomous tech support, research and rural development organization, Acaresc (*Associação de Crédito Rural de Santa Catarina*), and supported after 1975 by the state company of agriculture and breeding research, Empasc (*Empresa Catarinense de Pesquisa Agropecuária*). The program was set up in consideration of the high cost of fruit imports and to create new commercial opportunities for farmers. The state later hired Safra S.A. as exclusive provider of sprouts for Profit. This ideal moment for developing temperate climate fruit production, with the benefit of both state support and

¹⁸ J. Bleicher, *Interview with Jó Klanovicz*, Florianópolis 15 May 2002.

¹⁹ M. Brandt, "Criação da Sociedade Agrícola Fraiburgo (Safra) e o início da pomicultura em Fraiburgo/SC, na década de 1960", in *Revista Discente Expressões Geográficas*, 1, Florianópolis 2005. p. 12.

private investment, was marked by a proselytistic spread of the belief in technology as the “controller and corrector of nature’s flaws”, as Fraiburgo agronomy technicians claimed. By this stage, several environmental limitations had been imposed on fruit-planting projects, and some new or different relationships between human and the environment in the apple-producing areas had arisen.²⁰

Reflor Ltda. had begun planting orchards on their own land, as well as on rented and co-owned land. Their sprouts were supplied by Safra S.A. In 1969, another Frey family business, Renar Agropastorial Ltda., was established to carry out fruit-planting projects using the services of both Reflor Ltda. and Safra S.A. The new company planted apple orchards under fiscal incentives and using “resources originated from the timber exploitation of the mother-business (René Frey & Irmão Ltda.)”; in other words, tax funds reinvested in the family capital. All these businesses employed Profit technicians.²¹

To sum up, the foundation of Safra S.A. and other temperate climate fruit planting businesses in Fraiburgo in the 1960s and 1970s was favored by strategies of investment and reinvestment in vast orchards making intensive use of machinery, with the support of public incentives. From a macroeconomic point of view, these strategies appear to have been successful: between 1960 and 1969, the national apple production gradually began to catch up with imports, as shown in Tables 1 and 2.

In 1969, Brazil was still an apple-importing country; however, it had raised incentives to apple production in a perspective of future self-sufficiency based on the southern production. From the business point of view, at least the country had begun producing the fruit for its internal market, using modern techniques, although exportation was still not a reality. Any ecological issue could be solved with technical knowledge, Fraiburgo being, in Willy Frey’s words, a “vast experimental field.”²²

²⁰ J. Klanovicz, *Natureza corrigida: uma história ambiental dos pomares de macieira no sul do Brasil*, Universidade Federal de Santa Catarina, Florianópolis 2007, p. 230.

²¹ Ibid.

²² W. Frey, “Relatório sobre a situação atual da Reflor”, in *Processo de criação do*

Table 1. Brazil's apple importation (1960-1969)

Country	Metric Tons/Year									
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Argentina	36,424	43,232	50,153	64,194	38,477	59,579	54,629	85,507	108,222	105,074
Canada	-	-	-	-	-	-	799	599	-	-
Chile	-	-	-	-	-	-	-	-	394	550
USA	-	-	-	-	-	-	939	1,832	131	35
France	-	-	-	-	-	-	-	38	4,947	7,978
Greece	-	-	-	-	-	4	44	22	178	241
Uruguay	-	-	-	-	-	-	-	236	-	-

Source: K. Ushirozawa, *A cultura da maçã*, Acaresc, Florianópolis 1979, p. 88.

Table 2. Brazil's apple importation (1960-1969)

Year	Apple production (metric tons)
1960	9,513
1961	9,981
1962	11,300
1963	11,620
1964	10,578
1965	11,987
1966	11,779
1967	12,392
1968	13,035
1969	14,432

Source: Eta/Ministério da Agricultura, cited in M. de L. Sezerino, *As condições climáticas e o cultivo da maçã em São Joaquim, Santa Catarina*, Universidade Estadual Paulista, Rio Claro 1982, p. 85.

In 1973, Carlos Alberto de Abreu,²³ the administrative manager of Safra S.A., stated that Brazilian temperate climate fruit such as apples, pears, prunes, and plums were going through a rough patch, which required imports of European genetic material, as well as adaptation and treatment. At the time, Safra S.A. had the national lead in the market, with 1013 ha of temperate climate fruit orchards.

Curso Técnico em Agropecuária da Escola de Segundo Grau Sedes Sapientiae encaminhado para a Secretaria Estadual de Educação, B. Simonetti (ed.), Fraiburgo 1973.

²³ C.A. Abreu, "Histórico da Sociedade Agrícola Fraiburgo", in *Ibid.*

Their crops included Merlot, Cabernet, Trebbiano, and Marzenino grapes; St. Rosa and St. Rita plums; and Golden Spur, Red Spur, Golden Delicious, Wellspur, Melrose, Blackjohn, Royal Red, and Willie Sharp apples, among others. In 1973, Safra S.A.'s output rose to 414,718 sprouts (395,154 of apple, 12,021 of prune, 4359 of plum, 794 of peach, and 247 of pear, as well as 1878 of rose and 265 of other fruit).

In the conclusion to his report, Abreu stated that the fruit sales of Safra S.A. were growing yearly in the same proportion as Brazilian yearly consumption.²⁴ Per capita apple consumption in Brazil grew from 0.65 kg/year in 1960 to 1.45 kg/year in 1970,²⁵ and this growth did indeed go hand in hand with the expansion of apple orchards in Fraiburgo. Several Brazilian companies had approached Reflor Ltda. with the intention to establish orchards and set up reforestation projects in the region, taking advantage of the fiscal incentives offered by the federal government. These companies used Reflor Ltda.'s own land under free loan or condominium regimes. A 1973 company report provides data on 10 reforestation projects undertaken between 1967 and 1970, in which a total of 3,618,750 sprouts of *Pinus taeda*, *Pinus elliottis* and *Araucaria angustifolia* were planted over 2176.34 hectares. Apple trees having been legally recognized as a species for forestation under Act #5,106/1996, Reflor Ltda. assisted 13 fruit culture projects between 1967 and 1973, planting 542,200 sprouts over 592.5 ha. In 1973 the company planned to plant 112,800 sprouts over 141 ha for the following year, and 240,000 over 300 ha in 1975, in the framework of a project named *Fazenda Castelo Branco III*.

By 1974, Reflor Ltda. had planted over 500 ha, employing a business strategy based on public policies encouraging forestation projects, as well as investment in research and specialized personnel. According to agronomist Jorge Bleicher,²⁶ fruit culture needed more

²⁴ Ibid.

²⁵ Associação Brasileira dos Produtores de Maçã, manuscript, Fraiburgo 2006.

²⁶ Bleicher, *Interview with Jó Klanovicz* cit.

professionals; at the same time, planting 500 ha in only a few years had led to deforestation, the opening of roads for the bringing in of machinery, the draining of soil, as well as the use of large quantities of lime for soil correction. Considering that in the 1990-2000 period the area planted by the company *Portobello Maçãs S.A.* used 25 to 35 tons of lime per hectare for the correction of soil acidity, and that orchards occupied an average area of 100 ha, we can infer that approximately 15,000 tons of lime were used in the 500-ha area planted by Reflor Ltda. Lime residues not only remain on the surface, but also contaminate rivers and aquifers.

In the initial expansion period of apple planting (1963-1975), soil acidity “correction” was not the only problem calling for investment and technical intervention on natural environments. Severe cutting of native forests, as well as the ever increasing use of miticides, fungicides and other agrochemicals, at a rate of growth proportional to that of the expansion of planted areas, had reduced the numbers of pollinating insects. Every new planted hectare brought forth environmental problems or limitations that challenged the technical knowledge behind fruit culture.

An important step forward was the solving of the issue of flower loss, thanks to research carried out by Israeli specialist Amnon Erez. The seeding process, Erez concluded, occurred at a slower pace in Fraiburgo due to insufficient exposure to cold temperatures (below 7.2° C for a minimum of 700 hours per year).²⁷ As a solution, he suggested intensive use of pollinating bees, as well as chemicals, to interrupt plant dormancy. In the words of Acaresc agronomist Jorge Bleicher: “Now that was wild! A new orchard expansion began in 1975, and this time the companies started felling the native forests to make room for the new plants. Apple trees began yielding 28-30 tons per hectare instead of 2-4. Profit was guaranteed, through technology.”²⁸

Still, another issue persisted in Fraiburgo: variety adaptation. In the early 1970s, many of the orchards were mainly planted with Red

²⁷ A. Erez, *Interview with Jó Klanovicz*, Florianópolis 12 February 2007.

²⁸ Bleicher, *Interview with Jó Klanovicz* cit.

Delicious and Golden Delicious. In his book *A cultura da maçã*, Japanese agronomist Kenshi Ushirozawa - who had been a member of a technical mission in Santa Catarina between 1971 and 1977 - claimed that producing these varieties at an average altitude of 1000m resulted in dry, lumpy fruit with low commercial quality. He hence suggested substituting these varieties with more precocious ones, such as *Gala* apples.²⁹ Thus, the Golden and Red Delicious orchards gave way to new orchards mainly planted with Gala and Fuji.

As regards the soil and landscape husbandry required for the new orchards, Ushirozawa's planting handbook gave the following indications:

It is advisable to mechanize apple farming as much as possible, and also to apply lime and thermal-phosphate (*yoorin*) and cause it to penetrate deeply before planting the sprouts. Clay soils must be drained in order to avoid the weakening or even withering of the plants.³⁰

At the end of the 1970s, as Kenshi Ushirozawa was carefully studying every possible aspect of fruit growing in Santa Catarina, in his experimental orchard Roger Biau was investigating adaptation and phytotoxicity. The results of his investigations were never published in scientific journals. Only memos for technicians working in the experimental orchard have remained, particularly those related to herbicide application.³¹ While Biau worked in a private company, Ushirozawa was employed in a governmental project to design appropriate strategies for the expansion of apple orchards in the state.

In its urge to expand orchards, and based on the positive results of both public and private research, Fraiburgo had felled most of the surviving native forest in Santa Catarina. Over 1000 ha were cleared every year between 1980 and 1983, according to data furnished by

²⁹ K. Ushirozawa, *A cultura da maçã*, Empasc, Florianópolis 1978.

³⁰ Ibid.

³¹ Examples include the testing of Gramoxone, Kamex, and Esapon herbicides, which proved effective in orchards without presenting apparent phytotoxicity and

economist Carlos Eduardo Frickmann Young.³² This devastation had isolated insect populations even more, reducing local biodiversity. The European bees introduced as a pollination aid for fruit plants – a technological success that had led to higher yields and better fruit quality – had become an annoyance for some people. Such is the case for Agronomy Technician #1,³³ who was allergic to bees and loath to work close to the hives. Although there are no data proving a reduction in the number or variety of bird and plant species in Fraiburgo, some of the interviewees claim to have observed such a reduction.³⁴

To sum up, the 1970s and 1980s saw a consolidation of fruit growing in Fraiburgo based on rational and mechanized fruit farming methods. This consolidation had attracted professionals and investment from various sectors, giving impulse to research. The population of the city grew from just over 2000 in 1967 to over 15,000 in 1985. By this time apples were the main source of revenue. The new intensively applied technology guaranteed high yields from orchards. Automated irrigation methods protected the crops from droughts. Military strategies were employed to detect hail storms and protect the plantations from them, involving the use of radars and the bombarding of clouds with rockets initially imported from France and Switzerland, later from the Soviet Union. Small fires were lit against September frosts, during the springtime flowering of the plants. Rather extreme phytosanitary treatments were employed against fungi and diseases. Water courses were diverted, and very efficient logistics were set up during harvests. All this empowered the discourse of technicians' success in "correcting nature's flaws" in the area, as

were used to treat narrow-leaved grasses in a second test carried out on August 18, 1975 (12 years after the establishment of the experimental orchard). Cfr. R. Biau, *Ofício aos técnicos 1*, Agrícola Fraiburgo S/A, Fraiburgo 18 August 1975. *Ofício aos técnicos 2*, Agrícola Fraiburgo S/A, Fraiburgo 18 August 1975.

³² C.E.F. Young, "Is Deforestation a Solution for Economic Growth in Rural Areas? Evidence from the Brazilian Mata Atlântica", Working Paper CBS-36-2002, University of Oxford Centre for Brazilian Studies, Oxford 2002.

³³ Agronomy Technician #1, interview by Jó Klanovicz, Florianópolis 12 January 2005.

³⁴ Frey, *Fraiburgo: berço da maçã brasileira* cit., p. 34.

deployed, for example, in a story published in *Veja Magazine*.³⁵

In the 1980s, varieties such as Golden Delicious and Royal Red were replaced with red apple varieties such as the New Zealander Gala (a cross of Kidd's Orange and Golden Delicious) and the Japanese Fuji (a cross of Ralls Janet and Delicious). Gala apples had been introduced in Fraiburgo by Safra S.A., and Fuji had been first imported from Japan by Acaresc technicians from the nearby city of Sao Joaquin.³⁶ However, these two varieties were relatively new to the state technicians in terms of technical knowledge and behavior. The proneness of the adult plant to attack by disease or plagues depended very much on the choice of graft holder.

Some technicians believe that the process of orchard expansion in Fraiburgo during the 1980s at the expense of secondary forests may have jeopardized future production, for example by establishing new ecological relationships between apple trees and fungi.³⁷ Indeed, fungi, along with mites, insects and the weather, were beginning to play an important role in this story, undermining beliefs in technological success in correcting the environment. Throughout the 1980s, the language of technicians and producers became increasingly belligerent in their descriptions of the environment of the expanding orchards. Their journals, notes, and activity calendars are rife with expressions such as "correcting nature's flaws", "powerful machines for environmental correction", "rockets to fight bad weather", and "rationalizing the landscape".³⁸ Similar belligerent terminology was employed with reference to the fighting of pests such as the red spider mite (*Tetranychus ludeni* Zacher), particularly in large plantations in the late 1980s. Mites had always been a concern for technicians and local producers, who took drastic measures to control them, notably the use of agrochemicals such as Dicofol.

As orchards expanded in both number and size, the quantities of

³⁵ "Domesticar a natureza", in *Veja*, São Paulo 25 March 1983, p. 89.

³⁶ Epagri, *Manual da cultura da macieira*, Editora da Epagri, Florianópolis 2002, p. 90.

³⁷ Bleicher, *Interview with Jó Klanovicz* cit.

³⁸ Simonetti, *Processo de criação do Curso Técnico* cit., pp. 13-26.

agrochemicals employed in them reached spectacular figures during the decade, particularly among producers with too little time and too many trees to treat, mainly to prevent diseases such as the apple scab and fight parasites such as the red spider mite. Fruit producers benefited from this routine of intensive planting and high productivity for a superheated market; that is, until ecology got in the way.

Throughout the 1980s the ecological situation remained precarious. The main problems came from pests such as the European red spider mite and fruit flies. With time, other problems emerged such as apple leafroller, stains on Gala leaves, and brown rot, as well as the return of plagues such as that of the Oriental fruit moth. Further diseases affecting apple orchards in Fraiburgo included bitter rot (*Rosellinia necatrix* (Harting) Berlese), bleeding canker (*Phytophthora cactorum* (Lebert et Cohn) Schroeter), Armillaria root rot (*Armillariella mellea* (Fries) Karsten), crown gall (*Agrobacterium tumefaciens* (E.F. Smith et Townsend)), canker (*Nectria galligena*), apple scab (*Venturia inaequalis* (Cooke) Winter), and anthracnose (*Glomerella cingulata* (Stoneman) Spaulding et Schrenk). As regards pests, the main concerns were the codling moth (*Carpocapsa pomonella* Linnaeus), several types of mites, the woolly aphid (*Eriosoma lanigerum* Hausmann), and the San Jose scale (*Quadraspidiotus perniciosus* Comstock).³⁹

Apple contamination in 1989

By 1989, the Brazilian apple production supplied the internal market and was being exported to Europe. In that year, apple-producing companies, particularly from Fraiburgo (Fischer Fraiburgo Agrícola, Grupo VF, Renar Maçãs, Pomifrai Fruticultura, Portobello Alimentos, and Pomigrai Frutas), harvested almost 300,000 tons between February and April. Nearly all the Brazilian apple production was concentrated in the South, particularly in Santa Catarina (in Fraiburgo and Sao Joaquim) and Rio Grande do Sul (in Vacaria).

³⁹ Epagri, *A cultura da macieira* cit.

Since 1985, the economic profitability of apple growing had induced fruit producers to further expand their orchards. The only space left for that purpose in the countryside of Fraiburgo was the surviving patches of mixed ombrophilous forest. When those were deforested, the producers faced problems such as the attack of fungi on apple-tree roots, as well as parasites that were often to take the blame for several ecological issues, such as the need to eradicate plantations, as well as economic issues such as low salaries.

Creating and expanding Brazilian apple orchards in the 1980s cost approximately US\$ 10,000 per hectare. It took three years from the planting of an orchard to the first harvest. However, an average harvest of 28 tons per hectare was enough to cover all the costs of yearly maintenance. Therefore, the selling of the crop – which got bigger and better every year – allowed producers to recoup their investments, which grew and were allocated more effectively over time. Profits from fruit culture had caused local and national associations (Associação dos Fruticultores de Fraiburgo and Associação Brasileira dos Produtores de Maçã) to invest in public sectors for agronomic research, which had generated a sort of mutual dependence between the state, agronomy research institutions, and the producing sector. An exemplary case is that of the state company for agronomic research, Empasc. In this "institutional symbiosis", companies implemented techniques and products to improve, reproduce, grow and sell apples, including research on fighting disease and parasites as well as the adaptation of apple tree cultivars from countries such as New Zealand, Japan, or France to the climate conditions of Southern Brazil – an important issue in fruit culture to this day.⁴⁰

The Brazilian fruit culture scenario in 1989 was as good as it could get, or so it seemed. The national per capita apple consumption rose from 1.9 kg/year in 1979 to 2.8 kg/year in 1988, and the 31,000 tons harvested in 1979 were insignificant when compared to the 300,000 of 1988-1989. The three largest apple-producing cities

⁴⁰ BRDE, *Cadeia produtiva da maçã: produção, armazenagem, comercialização, industrialização e apoio do BDRE na região Sul do Brasil*, BRDE, Porto Alegre 2005.

(Fraiburgo, Vacaria, and Sao Joaquim) housed the ten largest temperate climate fruit culture companies in Brazil, directly employing over 20,000 people and many more indirectly.⁴¹

However, between July and August 1989, two months after the apple harvest, a nationwide scandal hit ABPM. On the state border between Paraná and Sao Paulo, agriculture fiscals seized a load of apples, supposedly from Guarapuava in Paraná and Argentina. An analysis performed by the state technological institute, Tecpar (*Instituto de Tecnologia do Paraná*), came to the conclusion that the load was contaminated by the miticide dicofol, in violation of the Ministry of Agriculture memorandum of September 2, 1985 prohibiting the sale, use or distribution of organochlorated agrochemicals over all the national territory due to the potential danger they posed to the environment and human beings.⁴² The news about contaminated apples had a negative impact on sales. By the last week of July 1989, fruit producers had begun to report deficits.⁴³ Dicofol (C₁₄H₉Cl₅O) is a product of the hydrolysis of DDT (dichlorodiphenyltrichloroethane, chemically known as 1,1,1-trichloro-2,2-di(4-chlorophenyl) ethane).

In July 26th, 1989, while the polemic on the dicofol-contaminated apples was raging, *Exame Vip* Magazine published a cover story, entitled “Poison for dessert”, on the consumption of Brazilian contaminated apples.⁴⁴ Until then, the risk of toxicity in fruit had seldom been mentioned in the national press. The article claimed that the apple producers were to blame for the fact that the Brazilian population was ingesting intoxicated fruit. “About 2,500 chemicals,” the article stated, without specific reference to fruit, “are dissolved in a seemingly healthy diet, as well as hundreds of pesticides and dangerous fungi, which

⁴¹ Ibid.

⁴² Article 1st was set to “Prohibit in all the national territory the sale, use, and distribution of organochlorated agrochemical products destined to agronomy and other uses: Aldrin, Camphene, Toxaphene, DDT, Kepone, Endrin, Heptachlor, Lindane, Endosulfan, Methoxychlor, Chloramine, Dicofol, and Chlorobenzilate”.

⁴³ T. Pogliá, “SC produz 58,47% da maçã nacional”, in *Diário Catarinense*, Florianópolis 30 July 1989, p. 5.

⁴⁴ “O veneno vai à mesa”, in *Exame Vip*, São Paulo 26 July 1989, p. 40.

conspire against good nutrition”. It also admitted, however, that “it is necessary to ingest a considerable amount of cancerous apples in ten years to be at serious risk of being afflicted with a tumor”,⁴⁵ although “when practically everything you eat may be tainted with one of the 2,500 known food chemicals, or the hundreds of agrochemicals, bacteria, or fungi, the percentage increases considerably”.⁴⁶

The apple contamination, the story ran, was a result of a dosage error in protective agrochemicals. As to the seizing of the 300-ton load of dicofol-contaminated apples: “The apples were coming from Paraná and Argentina and – thankfully – were intercepted. Except that several loads have been and still are being eaten since February, after the harvest”.⁴⁷ According to the magazine, it was the apple producers of Paraná and Argentina who were responsible for the contamination. The Paraná state authorities, however, refused to take the blame, attributing the problem to their acquisition of intoxicated fruit originating from Santa Catarina – a common practice among fruit producers in Guarapuava, who completed their stocks with fruit from other regions to meet demand. At any rate, fruit producers in this region of Paraná were ABPM members and hence in the same boat with the Santa Catarina producers.

On that same day, the *Gazeta Mercantil*,⁴⁸ published in Sao Paulo and regarded as the main Brazilian business newspaper, came out with the headline “Agrochemicals: Santa Catarina has produced contaminated apples”. The newspaper had received information on the cancerous substance residues in the apple samples analyzed by Tecpar, and was aware that the Paraná state authorities had held the producers from Santa Catarina responsible. The story outlined the temperate climate fruit crisis, including some complaints from the Argentinians, the former and traditional apple suppliers for Brazil.⁴⁹

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸ “Agrotóxicos: Santa Catarina produziu maçã contaminada”, in *Gazeta Mercantil*, São Paulo 26 July 1989, p. 13.

⁴⁹ “Autoridades argentinas querem normalização das vendas no Brasil”, in *Gazeta Mercantil*, São Paulo 1 August 1989, p. 9.

That week, in the city of Lages in Santa Catarina apple producers distributed free fruit among the population that week; they also blocked Road BR 116 as a protest against the fall in apple sales (*Consumo de maçãs...*, August 2nd 1989, p.23).⁵⁰ In Fraiburgo, several clippings and fax messages went back and forth among producers and within the ABPM following the crisis and its coverage by the Rio de Janeiro and Sao Paulo newspapers.⁵¹

In the last week of July 1989, under pressure by national producers and concerned about the possible commercialization of contaminated fruit, the Brazilian government put an embargo on Argentinean apples. The reaction came immediately: On August 1st that year, Argentina demanded the instant normalization of its apple trade with Brazil, claiming that its “apple export companies [were] in strict compliance with the sanitation laws enforced by the Brazilian Ministry of Health”, and expressing fears “that Brazilian imports [might] drop, unbalancing trade between the two countries”.⁵²

In a counterpropaganda effort by ABPM, in July 30th the *Diario Catarinense* newspaper - the main press vehicle in the state - devoted a page to the issue under the headline “Santa Catarina produces 58.47% of the apple production of Brazil”. According to journalist Tarcísio Pogliã,⁵³ Brazilian orchard productivity had been growing at the same rate as the national population, but was now being jeopardized by the dicofol polemic. Pogliã explained that dicofol had been used “on apple trees in several countries, such as the United States, West Germany, France, Italy, Sweden, and Argentina. It was used in Brazilian orchards until its prohibition in 1985. However, this agrochemical is still allowed in Brazil in orange and cotton plantations”.⁵⁴ Quoting the words of the president of ABPM, the agronomist Luiz Borges Junior, Pogliã argued that, while the use of

⁵⁰ “Consumo de maçãs já caiu 70% nos últimos 30 dias”, in *Gazeta Mercantil*, São Paulo 2 August 1989, p. 23.

⁵¹ “Fax enviado à Fischer Fraiburgo Agrícola”, manuscript.

⁵² *Autoridades argentinas querem normalização das vendas no Brasil* cit.

⁵³ Pogliã, *SC produz 58,47% da maçã nacional* cit.

⁵⁴ *Ibid.*

dicofol on apple trees was indeed prohibited, the episode “was an isolated case, and the contamination level found was 20 times lower than that allowed by the World Health Organization”.

The ABPM’s claim that this application of dicofol was an isolated case, however, was contradicted by Acaresc agronomist Paulo Baggio. In 1989, he argued, Brazil exported apples to Europe and these were normally treated with dicofol; the product would have been returned if any problems were noticed. Baggio reminds his readers that “before its prohibition in Brazil, dicofol was used for over 10 years in 31 cultures, including tomatoes, beans, and potatoes, and there were no intoxication problems”.⁵⁵ In the *Diario Catarinense* newspaper story cited above, Luiz Borges Junior pointed to some sort of conspiracy behind the dicofol polemic: “The news of apple contamination in Guarapuava went nationwide because there are several sectors interested in damaging the Brazilian apple production. As... national apples increased their internal market participation over the last ten years, importing companies have had to reduce their market action”.⁵⁶

The next controversy in the press was about the way ABPM had countered the accusations of intoxicating Brazilian apples, a reaction which was also reported in nationwide newspapers and magazines. “We must do away with this misunderstanding about contaminated apples”, the organization’s spokesperson told the *Gazeta Mercantil* magazine, in an obvious reference to the article published by the same newspaper on July 26th. The article affirmed that “dicofol was used in a few plantations in Paraná state – but at levels far below the acceptable limit in any developed country. A part of this amount [of apples] will be lost if the market situation is not reversed by September”.⁵⁷

On the next day, Fraiburgo-based company Renar Maças S.A. ran the headline “Santa Catarina producer claims that ‘Renar Apples contain no dicofol’” in the *Gazeta do Povo* newspaper of Curitiba (Paraná):

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ *Gazeta Mercantil*, *Consumo de maçãs já caiu 70% nos últimos 30 dias* cit.

Concerning the recent happenings involving Brazilian apples – until then considered to be top quality fruit, and now suddenly the object of news reports which, by mentioning the use of dicofol, have cast upon them the stigma of a forbidden fruit - this newspaper has interviewed one of the greatest authorities on the subject. Willy Frey, a pioneer in the growing of the much appreciated fruit on Brazilian soil, is the director of Renar, a company responsible for the largest volume of apples produced in Santa Catarina... . The company had the dicofol buried with the greatest care and precautions, and since then has strictly forbidden its use in the many square kilometers of the Renar plantation (*Produtor catarinense...*, August 3, 1989, p. 11).⁵⁸

In its turn, the ABPM paid for a one-page story published in the *Veja* magazine and in both the *Diario Catarinense* and *O Globo* newspapers to reassure the public regarding the quality of Brazilian apples and orchards in Fraiburgo. In *Veja*, the story was illustrated, and challenged the market competitors of the Brazilian fruit with the slogan: “Brazilian apples don’t give a banana for the competition”.⁵⁹ Under a red apple in the center of the page, and between an anti-hail rocket, a radar antenna, and a cartoon-like apple tree, was the following text:

In Brazil, apples are born in golden cradles. They get all the best, ever since they are tiny. Scientific development of the most appropriate species, specially prepared soil, and radars to control weather conditions in association with anti-hail rockets. All this care might seem exaggerated. But we are not afraid to pamper our apples. They grow to be quite grateful. They return this care in the form of a healthy, beautiful fruit, full of vitamins and nutrients. After they get big, they go out into the world and give fame to our national agriculture with their high quality. The Brazilian apple is not afraid of competition, because she know she is tasty (ABPM).⁶⁰

In that same week, another ABPM advertisement was run in some magazines against those who were seeking to give the national apple

⁵⁸ “Produtor catarinense reafirma: maçãs Renar não têm dicofol”, in *Gazeta do Povo*, Curitiba 3 August 1989, p. 11.

⁵⁹ ABPM, “A maçã brasileira dá uma banana para a concorrência”, in *Veja*, 1.091, 31, São Paulo 9 August 1989, p. 68.

⁶⁰ *Ibid.*

production “a bad name”. This time, the text went more into the details of fruit production, and made a pun on the Garden of Eden, symbolized by a serpent next to Adam and Eve in the center of the page, and the belief in the role of technology. The article elaborated on legends, prejudices, and ignorance about apples:

Legend has it that the Brazilian apple is of Third-World quality. Is it truly a sin to think so. The Brazilian apple is, today, a fully developed product. It can bear comparisons with fruit from any other country without any risk of blushing. You might not know this, but there is an association called ABPM which endorses the quality of our fruit. ABPM encourages and promotes all the advanced techniques used to develop and take care of the Brazilian apple. Today, the Brazilian Gala tastes better than the New Zealander original. The Golden is juicier than its North American cousin. Our Fuji is tastier than its Japanese forebears. You might not believe this, but the North Americans and Europeans do. And they eat our apples with great pleasure. Of course, to go so far the Brazilian apple had to religiously comply with the strictest technical and legal requirements. It complied, proved its worth, and entered the kingdom of worldwide consumption. ABPM had its part in this story. We do not promise paradise. What we do promise is a pure and honest product. Only a serpent would deny this.⁶¹

In a nationwide campaign, ABPM denied the existence of prohibited agrochemical use issues in Brazil. However, agronomy technicians and engineers claimed that dicofol was still being used, particularly in Fraiburgo. Agronomy Technician #2 remembers that the product “was widely used. It was dangerous, but good, because it was efficient. We used it all the time. All I know is that many didn’t even know it was prohibited, and some companies had a lot of this product in Santa Catarina, Rio Grande do Sul, and Parana. But we knew there was a use limit”. Agronomy Technician #3 also claimed to have used dicofol frequently in the treatment of apple trees for mites, in Fraiburgo. On the days the product was applied, “we were very careful, we kept telling the tractor drivers to put on all the security equipment: mask, glove, overalls. Of course, without

⁶¹ ABPM, “Alguns fatos sobre o fruto que já deu origem a muitas lendas”, in *Vêja*, 1.091, 31, São Paulo 9 August 1989, p. 68.

overalls and boots they couldn't even drive a tractor, but on those days they had to wear more, they had to put on a mask and gloves. I made them all do it, and I wouldn't let anyone work without the equipment".⁶²

Fraiburgo technicians report that at the time when the dicofol polemic was being publicly discussed they had been ordered to dig large holes in isolated spots far from the plantation to bury any dicofol tanks that by any chance might still have been in stock. Agronomy Technician #2 narrates: "I was told to take a bin⁶³ and a tractor to the chemical deposit and take all the dicofol containers. After that, two workers dug a hole with a backhoe loader, away from the orchard and the rivers, but close to the woods. I remember that I went back and forth many times with the tractor and bin for two days to bring the containers. After that, the order was to bury it all, and bury it well".⁶⁴

The only possible response for the producers was to insist on the discourse about the technical correction of nature, affirming through evocative rather than technical language, with recourse to literary turns of phrase, that the country was technically self-sufficient, having the know-how required to control every step in the process of apple culture, and that the national apple was not merely a product of trees, but also of human technical work on the natural world.

It was not a mere coincidence that at the end of 1989 Willy Frey released his book *Fraiburgo: berço da maçã brasileira* (cradle of Brazilian apples). He starts with a basic overview of apple production in the city, in an area which the author himself had described in 1973 as "a vast experimental field for temperate climate fruit culture" for the "Brazilian capital of apples":

I have spoken, in simple language, of the nutritional and therapeutic properties of apples; and of the tricks that the fruit producer uses to "deceive" the apple trees to get them to increase their productivity. Apple trees are quite docile...

⁶² Agronomy Technician #3, *Interview with Jó Klanovicz*, Florianópolis 12 May 2005.

⁶³ Wooden boxes into which harvested apples are collected, with a capacity of 300 kg.

⁶⁴ Brazil, Decree 3.964, 21 December 2000.

Do you know why? One can grow four or more apple varieties on a single tree trunk; and produce, out of that one tree, red, yellow, and green apples. These varieties can also offer four different maturation and harvest periods, between January and May. This seems to appear as a true miracle to the public.⁶⁵

Frey further elaborates:

The first fruit of a new, three-year-old apple tree pop out at the extremities of the branches. It is the law of nature! But man can deceive the plant and force nature. By doing that, the tree will produce one year earlier. The importance of this technique does not lie so much in early production as in the fact that, by producing earlier, the apple tree spends all its energy in making the fruit, forgetting to produce large branches and thicken its trunk.

After describing the tree and its docility, Frey appropriately turns his gaze to the issue of apple production in cold weather, the most significant climate-related phenomenon for fruit culture projects in southern Brazil. Again, the author elaborates on the rule of technology over nature, as had Kenshi Ushirozawa before him:

in cold countries, apple trees “sleep” under the snow and awaken in the spring, and thus flourish uniformly, making perfect pollination possible. In Brazil, the cold is irregular; the heat causes some of the apple trees to wake up before others, due to several factors such as their location on high or low terrain, or the variety they belong to. This issue was dealt with by using technology.⁶⁶

Thus, in his crusade in defense of Brazilian farming, the other goes through all the stages of fruit culture, constantly insisting on the role of technology in the success of Brazilian apple production in the 1980s. Frey does not neglect to mention deforestation and some other negative ecological consequences of apple planting in Fraiburgo. Notably, he discusses the issue of pollination, which had been difficult in the 1960 decade because, he affirms, there was little left of the original forest cover around the orchards, and the populations of pollinating insects were hence low.⁶⁷ In this case, too, the solution was technologi-

⁶⁵ Frey, *Fraiburgo: berço da maçã brasileira* cit.

⁶⁶ *Ibid.*, p. 32.

⁶⁷ *Ibid.*

cal. In a book sponsored by Frey and written by Gentila Porto Lopes, which came out in the same year, the author claimed that Fraiburgo had no ecological issues, even suggesting that apple production had made the city a model of environmental conservation, since the planting of apple orchards had expanded the woodland.⁶⁸

The issue of toxicity in Fraiburgo

Contrasting Willy Frey's denial, in 1989, that orchard expansion had altered the environment and biodiversity in Fraiburgo with the first environmentalist denunciation of the pesticide catastrophe in the early 1960s, especially as formulated in Rachel Carson's *Silent Spring* (1962), may help to shed light on some aspects of the 1989 debate on dicofol-contaminated apples. By comparing two different ages, spaces, and points of view on the relations between human beings and their environment, we can step outside the strictly academic sphere and see the heated debate on toxicity and the contamination risk of allegedly healthy food both from the perspective of the public and from that of private individuals.

Carson's work had broken through an information monopoly, opening a debate on the use of agrochemicals in the USA in the 1960s that eventually became part of a broader discussion on agricultural industries and their future, as well as the lethal potential of modern agricultural projects with strong capitalistic orientations. In a similar way, the news in the Brazilian press on the contamination of supposedly healthy fruit such as apples had brought up the issue of the world being threatened by excessive rationalization in the service of profit. To a certain extent, this public constitution of an environmentalist awareness, dominated by the image of a threatened world, democratized the debate on agrochemicals in a country whose agriculture made ample use of herbicides and pesticides.

The publicity given to the dicofol contamination of Brazilian apples in 1989 brought up the issue that human intervention on the

⁶⁸ G.P. Lopes, *Glória de Pioneiros: o Vale do Rio do Peixe*, Lítero-Técnica, Curitiba 1989.

natural world in Fraiburgo had not had only positive consequences, in terms of local economic growth, but also negative ones in terms of socio-environmental impact; in the case of apple farming, first the devastation of the native forest to plant orchards, and later the increasing use of chemicals to boost yields. The application of agrochemical products had become a part of daily life in the fields, as well as in the urban area, transforming the city into a toxic space, a land polluted by agrochemicals, where the actual levels of contamination still remain to be ascertained.

Technically speaking, agrochemicals are classified in pesticides, fungicides and herbicides, and further subdivided according to their targets (ovicides, larvicides, miticides), action (through ingestion, contact, or in micro-scale), and origin. To mitigate the negative effects of agrochemicals - although long after they had been introduced and regularly used in the country - on December 21, 2000, the federal government of Brazil issued Act #3964, which requires industries to register the components of the raw materials, ingredients, and additives used in the production of agrochemicals. This legal instrument was a derivation of measures taken in 1985 by the Ministry of Agriculture outlawing the sale and use of the most harmful agrochemicals, known as the “Dirty Dozen”. Agronomy Technician #4 claims that during the 1970s mercury-based fungicides were widely used in Fraiburgo.⁶⁹ Only after 1985 were forms of control finally enacted; which is not to say that agronomy technicians and engineers had not been aware of the problems and risks beforehand.

The publicity around the contaminated apples episode had strengthened the idea of agrochemicals being dangerous, in spite of the reaction of apple business companies to the drop in sales of the Brazilian fruit just as the sector was consolidating. Particularly since 1960, toxicity has become a part of our everyday life, one of several modern anxieties regarding nature. The term “toxic” itself has acquired new connotations, carrying a wide range of meanings as well as a strong emotional load, as Jake Sigg argues (1999). Actually, toxicity is only

⁶⁹ Agronomy Technician #4, *interview by Jó Klanovicz*, Florianópolis 2 February 2004.

defined in relation to other elements; for example, oxygen is toxic for certain organisms and essential for others. Likewise, products such as salt, chloride, or aspirin in high doses may be toxic for human beings, but are beneficial when ingested in proper quantities.

An issue with strong emotional implications and related to the specific question of the politics of agrochemical use is that of the safety of humans, microorganisms, the soil, wildlife, and ecosystems. After 1980, humans living or working in the apple plantation districts in Fraiburgo began to complain about ailments induced by artificial agents employed to help the apple trees to compete with other organisms, such as copper sulfate, lime, benomyl and captan.

In the second half of the 1980s, knowledge about phytosanitary treatments and the presence of agrochemicals in fruit trickled outside the circle of those directly involved in production to reach the general public. The wish to consume cleaner and better-quality fruit, acutely felt by consumer markets ever since the 1960s, was empowered as a result of modern anxieties such as the fear of agrochemicals.

In this sense, by understanding the landscape we can position the environmental imagination vis-à-vis a specific time and place. The world of modern fruit planting in Fraiburgo had created a modern landscape that brought with it the anxieties of modernity, the agronomic hubris, and the faltering of trust in progress, particularly in the critical moments of 1989.

While diseases and plagues are ecologically linked to apple trees, the historical fact of their occurrence is the result of the agency of human beings, who are often invisible but fundamental actors in the process of the constitution of ecological relations. Expressions such as "natural tragedies" and "nature's flaws" reflect specific conceptions of the landscape. At the end of the 1980s, Brazilian apple farming appeared as an efficient, modern and profitable sector of the economy, contributing to the development of areas such as the Fraiburgo district. This success turned apples into a fetish around which the city's economic development came to revolve. However, in the process of constructing the local history of apples, a contradiction sys-

tematically lurks behind the narratives: although the apple tree is usually regarded as a boon for the local economy, it is characterized not as a strong, superior plant, but as a docile and fragile one that needs to be cared for and controlled.

Being one of the first cultures in Brazil to be intensely rationalized and expanded to supply the national and later the international market, apple growing was “one of the first profitable temperate climate fruit productions in a country historically known as tropical”. This rationalization involved intensive use of potentially toxic agrochemical products, making Brazilian apple farming an issue in the broad debate on concepts such as food safety and toxicity in contemporary society. The historical construction of the notion of agrochemical risk gained strength in the 1980s as conventional agriculture projects expanded throughout Southern Brazil, largely as a reflection of modern anxieties regarding nature.

Brazilian historians have so far devoted little attention to the discourse on toxicity as a set of interconnected issues, whose strength is partly derived from late industrial cultural anxieties, and partly from deeply ingrained thought and word habits.⁷⁰ At least two possible reasons can be offered for this neglect: a trend within Brazilian public opinion to regard the issue in purely pragmatic terms; or the manner in which environmental issues are regarded in Brazilian culture. In the humanities, discussion on the topic only acquired relevance in Brazil at the beginning of the twenty-first century, under the impulse of environmentalist movements.

⁷⁰ L. Buell, *Writing for an Endangered World*, Harvard Belknap Press, Boston 2003.

