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## Terminator Trends

### *The 'Silent Spring' of Farmers' Rights*

#### Seed Saving, the Public Sector, and Terminator Transnationals

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**The only thing that can keep pace with the rate of agricultural biotechnological change these days is the speed with which the transnational Life Industry is eating itself. In the last couple of years, Monsanto has spent more than \$6.7 billion buying seed and other ag biotech companies. Now, American Home Products is merging with Monsanto for another \$33 billion. Other massive mergers are inevitable within the next few months. That transnational agri-business wants to stop farmers from saving seeds and conducting their own plant breeding is hardly news. That the battle over Farmers' Rights has come so abruptly to a crisis is news that governments and the scientific community are trying to ignore. We have at best two years, and at worst six months to safeguard the right of farmers as seed-savers and breeders. Rather than coming to their defence, public sector institutions are keeping silent or joining in the attack. Either way, public researchers could be contributing to the destruction of agricultural biodiversity. Who's interests are being served? The 12 thousand year-old right of farmers to save and improve seed could be coming to an end - now. Governments at FAO's Commission on Genetic Resources for Food and Agriculture (CGRFA) could turn this around when they convene in Rome from June 8-12. FAO's "Gene" Commission, which will have to debate Farmers' Rights, offers the last hope for intergovernmental moral leadership.**

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## Terminator Trends

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National and international institutions appear to be facilitating a range of legal and biotechnological measures intended to stop farmers from saving seed and breeding their own plant varieties. In the process, agricultural biodiversity will further erode and the food security of at least 1.4 billion poor people (who depend on the commodities harvested from farm-saved seed) will be imperiled. Aside from the biological and legal terminators at work here, moral terminators are also being applied. It is now postulated as "realistic" for farmers to sacrifice their own food security through plant breeding and, instead, trust their survival to the goodwill of private agri-business and the waning courage (and declining budgets) of public institutions. It is "realistic" for commercial breeders in some OECD countries to expect seed cleaners and conditioners to collect royalties on saved seed. Here is a summary of six Terminator Trends. *Do not adjust your mind, there is a fault in reality!*

### The Biological Terminators

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**Terminator #1 - USDA Patents 'Neutron Bomb' for Seeds:** On March 3<sup>rd</sup>, the U.S. Department of Agriculture, a public institution with a mandate to work for farmers, announced that it had received - together with the Delta and Pine Land Company U.S. Patent #5,723,765 - a patent on a technology that renders seed sterile. While the seed that farmers purchase will germinate, any seed they save for a second season will not. The cotton seed company (which had controlled 73% of the U.S. market) was acquired by agribusiness giant, Monsanto for \$1.76 billion on May 11th. Monsanto now claims 85% of the U.S. cotton seed market. On announcing the patent which covers all species, USDA researchers said their goal was to help U.S. seed companies profit from the export of proprietary seed to Third World farmers. (For further details, please see RAFI's internet homepage at [www.rafi.ca](http://www.rafi.ca) and our March/April RAFI *Communique*, "The Terminator Technology".) The USDA and Monsanto are contractually committed to coming to terms on a potentially exclusive global licence on Terminator #1 by October, 1999. Researchers state that the technology can be applied to all crop species. *Governments and UN Agencies should deny patent certification and market access to the technology on the grounds that it is contrary to ordre public (including national food security). The USDA could also be asked to deny Monsanto exclusive monopoly control over the technology.*

**Terminator #2 - USDA introduces 'Trojan Dolly' Crop Patents:** On January 20<sup>th</sup>, 1998, the USDA won patent #5,710,367 covering "apomictic maize". In late May, USDA was also told it would receive a second U.S. patent covering apomictic millet. The apomixis trait creates genetically-identical plant "clones" (*Dolly* for plants) that reproduce without variation from season to season. Farmers can replant. On another front, in early March, CIMMYT, the publicly-funded International Centre for Maize and Wheat

Improvement based in Mexico, in company with the French research institute, ORSTOM, began negotiations with the world's remaining maize-breeding institutions to licence its own pending patent on the apomixis technology. Normally, global maize breeders deal only with hybrid seed (seed that will not reproduce "true" when replanted). Hybrids are the *Terminator Rex* of agro-biodiversity. Developed in the 1920's on the assumption (which many regard as illusory) that widely-crossed inbred lines provide a "hybrid vigour" that makes the inability to save seed worthwhile for farmers, hybrids have taken over the commercial maize market in most OECD countries. Maize multinationals have been frustrated that their market has been limited in the South because most farmers can't benefit from buying seed every season. The revolutionary "apomixis" technology could offer the same (disputed) "hybrid vigour" but make it possible for farmers to re-grow seed. Companies are betting that the apomixis trait will prove to be the "Trojan Horse" that leads more Third World farmers down a company-guided path to old-fashioned hybrids. (See later discussion in this paper.) *The USDA and CIMMYT (within the framework of CGIAR) could be asked to study the potential social and environmental impact of apomixis. Depending on the outcome of these studies, the two bodies could either consider rejecting the trait or developing policies and practices to assist governments and farmers to secure local in situ conservation of their crop germplasm.*

## The Legislative Terminators

**Terminator #3 - UPOV '91 Takes Over:** On April 24<sup>th</sup>, the Union for the Protection of New Varieties of Plants (UPOV), a UN-hosted convention, closed the door on its twenty year-old 1978 accord that left open the possibility for farmers to save seed and breed new crop varieties using seeds "protected" by national Plant Breeders' Rights legislation. UPOV is now advising South governments to adopt its 1991 Convention that prohibits farm-saved seed and further restricts the classic research exemption that historically allows breeders to learn from one another. UPOV, a public institution, is working with the global seed industry against the interests of farmer/breeders. *South countries that have joined either of UPOV's Conventions could take the opportunity of UPOV's October 28<sup>th</sup> Council meeting to demand special exemptions for at least the South's farmers to save seed.*

**Terminator #4 - TRIPS Traps Farmers:** In 1999, the World Trade Organization (WTO) will begin a limited review of its TRIPS (Trade-Related Aspects of Intellectual Property) chapter concerned with the "protection" of plant varieties. TRIPS obliges signatory states to either allow industrial patents or to legislate an "effective" *sui generis* system securing the monopoly interests of commercial breeders. The *sui generis* option is a possible loophole allowing the South to soften the monopoly impact and to safeguard the right of farmers to save and develop their own varieties. However, some OECD governments have made it clear that they interpret the 1999 review as an opportunity to press for more stringent monopoly mechanisms. The USA wants agreement that TRIPS compliance means either UPOV'91 or plant patents. In either case, farmers would no longer be allowed to save and develop "protected" seed. Depending on their "development" status, South countries will be obliged to entrench plant monopolies either in 2000 or shortly thereafter. *South signatories to the Uruguay Round could use the TRIPS Review to demand that ordre public be available to prevent the "patenting" of any life form - especially food species.*

## **The Morality Terminators**

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**Terminator #5 - CGIAR's Wobbly Approach to "Pro-Poor" Political Advocacy:** Although there is growing alarm within the CGIAR Centres that intellectual property is out of control, the System's just-concluded meeting in Brasilia actually endorsed a brain-teasingly offensive "defensive patents" strategy. Then, declaring itself to be firmly "pro-poor" and ready to become "political" and "advocates" for farmers, the same meeting backed an aggressive pro-biotech policy that implicitly encourages the development of transgenic species. Yet, the CGIAR shied away from explicit support for farming communities in their most immediate and vital struggle. Indeed, a direct (if incomplete) plenary proposal stating that "Farmers' Rights" included the right of "resource-poor farmers in developing countries... to save, exchange, and adapt their seed" had to be withdrawn. Only in the closing minutes of the conference did CG Chair Ismail Serageldin, offer a hastily-cobbled re-interpretation of the dismal debate, suggesting that the CGIAR would work to "...empower to the maximum extent possible their [farmers] role in the conservation and improvement of seeds." This left some observers concerned that pro-poor political advocacy in the CGIAR would turn the public-service network into pro-active cheerleaders of dominant political trends. *CGIAR could redeem itself in Washington at International Centres' Week (Oct. 26-30) when the entire System will come together to consider the report of its Third System-wide Review. If the CGIAR takes the cue from its own Policy Committee and the Bratislava Conference of the Biodiversity Convention (also just completed), it would express its reservations about Terminator technology. CGIAR should also formally support the right of farmers to save, exchange, and develop seed without restriction or exception. It would also agree to review the socio-environmental impact of the apomixis trait.* On a closely-related front, CGIAR will have to determine whether or not it will safeguard internationally-held germplasm from "patent" claims by pressing its February proposal for a moratorium on claims on this material. While no one expects suicidal heroics from the CG System, it does carry a moral *cache* with many governments. If the CG does not speak out for farmers and for public research, few else will. *CGIAR could resolve to take a pro-active pro-Farmers' Rights position at FAO and in the WTO's TRIPS review.*

**Terminator #6 - FAO de-Commissions Farmers' Rights?** When the UN's FAO Commission on Genetic Resources for Food and Agriculture (CGRFA) convenes in Rome June 8 - 12, OECD governments are proposing a deal on access and benefit-sharing over crop germplasm in return for the South dropping its demands for "Farmers' Rights" - the practical recognition that the germplasm governments are haggling over comes from farmers. Spooked by the implications of a legal "right" for farmers to save, exchange, and breed seed, the OECD states are hoping that their South counterparts are only using Farmers' Rights as a bargaining chip to be negotiated away in return for a more favourable deal. If they're correct, the sole remaining international toehold offering farmers a basis for saving seed could crumble away this June. FAO's Commission has been the moral epi-centre of the volatile battle over the right of farming communities to save seeds. Its capitulation, especially if it follows the "silence of the CG lambs", will signal the collapse of intergovernmental resistance to crop monopolies. *In re-negotiating its International Undertaking, FAO Commission members should implement strong Farmers' Rights provisions including the inalienable right of farming communities to save and breed plant varieties.*

More thoughts on  
**Terminator #2 - "Trojan Seeds"**

There are three apomixis patents coming into the marketplace. While it is understood that the CIMMYT/ORSTOM claim is broader than the USDA maize claim, the USDA will ultimately transfer ownership of its maize and millet claims to one or more U.S. multinationals. Thus, the final battle between the competing maize patents may be decided on the basis of which party has the most lawyers, the deepest pockets, and the greatest political clout. CIMMYT's negotiations, at the moment, would keep apomixis in the public domain in the South. Ostensibly, companies would only use apomixis technology to reduce their seed production costs (solving problems of "outcrossing" within a hybrid's inbred lines) and would not develop their own apomixis varieties. Indeed, the companies currently scouting the USDA's apomixis research are more interested in isolating the gene or gene complex for the apomixis trait than licensing the patents.

CIMMYT will develop apomictic maize (perhaps five years down the road) for the South. Since these hybrid-like clones halt genetic evolution (allowing seed to adapt to micro-climates or new diseases over planting generations) even high-yielding and disease-resistant varieties will collapse relatively quickly. This could force more farmers to buy seed more often than today. Poor farmers could be encouraged by companies (or pressured by creditors - directly and/or indirectly) to abandon their own open-pollinated maize breeding practices, leading to a potentially serious loss of crop genetic diversity. Once this door is opened, global seed companies, perhaps subsidized by foreign aid or national credit programmes, will move in to meet the new production and distribution needs for apomixis (and possibly increase the market for hybrid) seed. This could happen despite CIMMYT's best intentions. In order to win for resource-poor farmers, CIMMYT has to steer its way through an ever narrowing number of bigger corporate players; changing patent environments; and national and international political winds. Worse still for the CGIAR, what CIMMYT is facing will soon become commonplace for other international public service institutions.

CIMMYT needs all the help it can get. In the past few days and months, the shape of the global maize industry has changed dramatically. Last summer, DuPont acquired 20% of the assets of the world's largest maize breeder, Pioneer Hi-Bred International. Monsanto, not to be outdone, bought Holden's which supplies more than a third of all US maize germplasm. Then, Monsanto went on to buy Dekalb (Pioneer's most serious competitor) for \$2.2 billion this May. On June 1<sup>st</sup>, American Home Products merged with Monsanto for \$33 billion - the largest merger in the short history of the Life Industry. Through other acquisitions, the new enterprise (as yet unnamed - RAFI suggests "American Home Monster") controls about one-third of the maize seed market in Brazil and about 40% of the same market in Argentina. The "Monster" will either see apomixis as a threat or as an opportunity.

There are many unresolved issues with respect to the apomixis trait. For example, when farmers use an apomictic clone as a cross in their own plant breeding, will the presence of the trait enhance or constrain their breeding flexibility? Will farmers be left with 'one hand clapping'? Or, will the apomixis trait prove itself to be more opportunistic - as early Swedish research suggested decades ago - and alter its expression depending on environmental stresses? Could companies combine the "killer" gene (Terminator #1) with apomixis? Perhaps most importantly, does the introduction of apomixis set resource-poor farmers on an "industrial agricultural" path that could ultimately destroy their livelihoods and the diversity around them?

Since the trait is most likely to be used on white maize (white maize flour is a half-billion dollar market in Meso-America alone) used in the making of tortillas, is there much remaining genetic diversity - or is this market so commercialized already that conservationists have little to fear from apomixis? At present, only about 9% of the tortilla market in the region is highly-commercialized. The availability of affordable clones could be attractive to the major processors and apply added pressure to farmers to adopt the new varieties. The following possible scenario is offered to prompt early discussion - not to draw final conclusions.

### A Credible Scenario?

1. CIMMYT "invents" apomictic maize together with ORSTOM. ORSTOM, with CIMMYT, applies for a patent covering the technology.
2. ORSTOM/CIMMYT adopt a policy that keeps the technology in the public domain in the South but allows others in the North to licence the technology. The assumption is that the North is only interested in apomixis for hybrid seed production advantage.
3. CIMMYT encourages public and private maize-oriented NARS to develop "local" apomictic maize varieties in the South. CIMMYT also begins developing its own varieties for resource-poor farmers in regions where NARS may not be able to meet the demand.
4. Over time, a public service-oriented approach to the dissemination of the apomixis trait emerges in several countries. Enterprising experiments emerge to work with farmers' cooperatives to preserve traits in Farmers' Varieties that have wider commercial application. Farm yields increase along with on-farm incomes. Many cooperatives are encouraged to develop plant breeding and seed-growing opportunities.
5. Although there are many positive examples to point to, most resource-poor farmers obtaining apomictic maize - while experiencing generally (but not uniformly) positive yield gains - also incur an erosion of their traditionally-diverse seed stocks and an increased dependence upon apomictic and/or purchased seed.
6. Although the demand grows unevenly, it is not long before it appears to outstrip the finite capacity of public service NARS and local entrepreneurs. To meet the demand (farmers are already losing the ability to breed from their own stock), CIMMYT and ORSTOM amend their policy to stimulate larger "for-profit" enterprises (including foreign subsidiaries) to use the apomixis technology in the South. The global companies agree to meet demanding standards for seed quality and pricing.
7. In order to ensure the highest-quality service, companies conduct seminars and provide educational materials for agricultural policy-makers, farm credit managers, and extension workers. As a consequence, access to credit and services becomes predicated upon acceptance of the "modern" apomictic varieties.
8. Before long, companies report an increase in demand for newer and better apomictic varieties. Older apomictic clones succumb to mutating pests and diseases, forcing farmers to buy newer clones. Better-off farmers are offered "premium" up-to-date hybrids. Resource-poor farmers are encouraged to buy the "latest" apomictic varieties. *In situ* genetic diversity declines. Commercial dependency increases. More marginalized farm families move to the cities.
9. As the years go by, plant breeding and seed-saving among resource-poor farmers slips toward extinction. Better-off farmers cling to their land buying high-cost apomictic varieties or hybrids. Resource-poor farmers have migrated to the cities to join the ranks of under-employed slum-dwellers. Hunger and malnutrition increase even though maize production has also increased.
10. There is a major loss of *in situ* genetic diversity; rural livelihoods; and food security. Corporate profits are at record levels.

### Apomixis - Advance or Apocalypse?

Advance	Apocalypse
1. Better-off farmers may benefit from a decline in seed costs as hybrid production becomes less expensive and faster.	In an oligopolistic market there is little chance that savings will be passed on to farmers. (Recently, Monsanto bought Dekalb and Holdens while DuPont has taken 20% of Pioneer. Then, Monsanto and Cargill agreed to a collaborative seeds initiative. This leaves only Novartis, AgrEvo, and Limagrain to rank with them among the world's maize leaders.
2. Resource-poor farmers can buy hybrid-quality while still being able to save seed. Their yields and incomes could increase.	The seeds farmers save are clones. There are three concerns: (1) the apomictic clones will not meet the varying needs of all resource-poor farmers within any region and the clones will not adapt to local conditions over time; (2) traditional varieties and <i>in situ</i> genetic diversity will disappear; (3) the cooperative breeding systems of farming communities will erode.
3. The South's guaranteed public access to apomixis could attract local and national entrepreneurs/ breeders to develop locally-appropriate varieties and other farm services.	Global maize corporations have South subsidiaries or partners who could claim discrimination if denied access to apomixis. Also, USDA licences will not constrain the trade of U.S. seed companies.
4. This could be an inexpensive and effective way to secure and commercialize Farmers' Varieties within a region or around the world, with the benefits going to the farmer-breeders.	Dream on Sunshine! This theoretical benefit will be overwhelmed by more powerful national and international corporate interests.
5. Resource-poor farmers won't buy apomictic maize unless they can make a profit in the first growing season. Its going to have to be very good before they will buy it.	CIMMYT will offer - and poor farmers will buy - just enough seed for them to test it the first season and have sufficient seed for larger production the second season. The apomictic variety may not have to be "great" - just "better" in order to set the treadmill in motion.
6. Poor farmers use all kinds of maize for all kinds of purposes, apomictic maize will probably only impact the maize they grow for market. The genetic erosion will not be great.	Resource-poor farmers are also power-poor. There could be substantial commercial/ credit/ or political pressure on them to devote more land to market production. History teaches us not to assume that local cultural traditions can always withstand powerful outside forces.

Advance	Apocalypse
<p>7. Maize multinationals have no interest in the high-cost, low-profit, unreliable market for apomictic maize among resource-poor farmers.</p>	<p>But their national subsidiaries - or their subsidiaries' subsidiaries - may. This is market creation. It could also be good publicity (ie. Monsanto's "Let the harvest begin"). Some companies will also genuinely believe they are contributing to world food security.</p>
<p>8. Every new technology causes displacement and erosion. A highly-beneficial new variety will always supplant traditional varieties and cause genetic erosion. The issue is whether the lives of people will be improved.</p>	<p>This is not a "variety" it is a "technology". This technology could directly constrain the capacity of farmers to do plant breeding and seed-saving. It is reasonable to incur risks if there is a high probability of benefit for the poor - and when the real risk-takers agree. Otherwise, humility should be exercised and studies should be undertaken.</p>

**The Bellagio Apomixis Declaration:** On May 1<sup>st</sup>, a group of international researchers dealing with apomixis meeting at the Rockefeller watering-hole in Bellagio, Italy concluded a common declaration expressing their concern that transnational agribusiness would thwart or mis-direct the development of this powerful new technology. "...We encourage the development of novel approaches for technology generation, patenting, and licensing that can achieve this [open access to new technologies] goal." This declaration - coming on the eve of the greatest wave of mergers to ever strike the maize-breeding industry - was prophetic. As much as we can admire and agree with their concern, the declaration's conclusion falls well short of the mark. More must be demanded of our public institutions than to always seek the safer road to the lesser-evil! Go to <http://billie.harvard.edu/apomixis> for the full text. To comment on the declaration, contact: [endorse@billie.harvard.edu](mailto:endorse@billie.harvard.edu).

**What can the CGIAR do?**

1. CIMMYT and/or the CG System could undertake an immediate study of all potentially positive and negative implications of the disbursement of apomixis in the South with a view to reporting to ICW'98.
2. In the interim, CGIAR should encourage the USDA to retain control of the Terminator #1 and #2 patents.
3. The results of the study ( in #1 above) could be widely-shared via publications and seminars, with governments, NARS, and farmers in the regions that may adopt apomictic maize.
4. As a precautionary measure, and in conjunction with NARS, farmers, IPGRI, and the FAO CGRFA, CIMMYT could consider a pro-active initiative to ensure that the local *in situ* conservation of maize genetic diversity is secured for the use of farmers and researchers.
5. CGIAR could consider the development of a technological impact "early-warning" system that will assist Centres and scientists in drawing the attention of the System to possible negative side-effects associated with the introduction of some new technologies. CIMMYT should be supported in its own efforts to monitor apomictic maize - socially, economically, and biologically.
- 6.