

Food First Policy Brief No.12: Ten Reasons Why the Rockefeller and the Bill and Melinda Gates Foundations' Alliance for Another Green Revolution Will Not Solve the Problems of Poverty and Hunger in Sub-Saharan Africa

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The Rockefeller Foundation and the Bill & Melinda Gates Foundation recently announced a joint \$150 million *Alliance for a Green Revolution in Africa* (AGRA),ⁱ provoking immediate criticisms that the proposal fails to take into account the failures of the original Green Revolution.ⁱⁱ The creators of AGRA claim the initiative will bring benefits to the African continent's impoverished farmers who—they assert—until now have been bypassed by the first Green Revolution. A day later, probably in an orchestrated move, Jacques Diouf, Director General of UN's Food and Agriculture Organization (FAO), called for support for a "second Green Revolution" to feed the world's growing population. UN boss Kofi Annan also weighed in to support the initiative.ⁱⁱⁱ

The AGRA plan is remarkable given that, according to a World Bank evaluation, over the last twenty-five years the CGIAR^{iv}—which brings together the key Green Revolution research institutions—has invested 40-45% of their \$350 million/yr budget in Africa (The World Bank 2004). If these public funds were not invested in a Green Revolution for Africa, then where were they spent? If they were spent on the Green Revolution, then why does Africa need another one? Either the Green Revolution's institutions don't work, or the Green Revolution itself doesn't work—or both. The Green Revolution did not "bypass" Africa. It failed. Because this new philanthropic effort ignores, misinterprets, and misrepresents the harsh lessons of the first Green Revolution's multiple failures, it will likely worsen the problem. These are 10 reasons why:^v

1. **The Green Revolution actually deepens the divide between rich and poor farmers.** *In the 1960s at the beginning of the first Green Revolution, the Rockefeller and Ford Foundations promoted industrial-style agriculture in the Global South through technology "packages" that included modern varieties (MVs), fertilizer, pesticides, and irrigation. The high cost of these purchased inputs deepened the divide between large farmers and smallholders because the latter could not afford the technology. In both Mexico and India seminal studies revealed that the Green Revolution's expensive "packages" favored a minority of economically privileged farmers, put the majority smallholders at a disadvantage, and led to the concentration of land and resources (Frankel 1973; Hewitt de Alcantara 1976).*

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In both Mexico and India studies revealed that the Green Revolution's expensive "packages" favored a minority of economically privileged farmers and led to the concentration of land and resources. In fact, a study reviewing every research report published on the Green Revolution over a thirty-year period all over the world—more than 300 in all—showed that 80 percent of those with conclusions on equity found that inequality increased (Freebairn, 1995). AGR's claim that Green Revolution technology packages will benefit poor farmers is misleading. Agricultural improvement with smallholders—who make up the majority of the world's poor—so they can feed themselves and produce a surplus for local markets, is a necessary step in combating hunger. But sustainable rural development is not just about increasing yields and economic growth. The failures of the Green Revolution have taught us that rural development requires the redistribution of land and resources, a fair and stable market and sound agroecological management in order to be sustainable. This is especially true for sub-Saharan Africa countries like Ethiopia, Sudan, Somalia and Mali where the area of unused, good quality farmland is many times greater than the area actually farmed. It is also true for Zimbabwe and South Africa where the majority of farmers have been excluded from access to minimally acceptable farmland. Most farmers in Sub-Saharan Africa cultivate a small area of land. These farmers are highly vulnerable to debt and will likely find themselves on the wrong side of the divide when land begins to concentrate following the further introduction of Green Revolution technologies.^{vi} For an extensive and documented review of the problems generated by the first Green Revolution, see chapter five of *World Hunger: Twelve Myths* (Lappé et al, second edition, 1998).

2. **Over time, Green Revolution technologies degrade tropical agro-ecosystems and expose already vulnerable farmers to increased environmental risk.** *Following the early socioeconomic failures, governments started subsidizing the Green Revolution packages in an effort to encourage adoption by smallholders. In areas where smallholder farmers did adopt the package, the spread of MVs greatly increased the use of pesticides and fertilizers, often with serious health, environmental and economic consequences.*

While Green Revolution MV seeds out-produced local varieties in good years under optimal conditions, they produced less than local varieties in bad years and over time did not perform well in the marginal environments where the poor live. This is because these so-called high-yielding varieties are actually *high-feeding varieties* that over time mine the fragile tropical and hillside soils—where the majority of the world's poor farmers cultivate their grains—of their natural fertility, requiring higher and higher applications of fertilizer (Gliessman 1998). This eventually degrades those soils, leading to **extensive erosion**.^{vii} Given the end of cheap oil, and the inevitable explosion of fertilizer costs, what kind of future does the Green Revolution really offer to poor farmers? The Green Revolution's genetically uniform crops also proved more susceptible to pests and diseases. To protect these crops, copious amounts of increasingly less effective and less selective pesticides are injected into the biosphere at considerable environmental and human costs.^{viii} In India, Green Revolution packages required **heavy irrigation**. The Indian government subsidized the digging some 21 million tubewells that according to Tushar Shah, head of the International Water Management Institute, bring 200 cubic kilometers of water to the surface every year (Pearce 2004). Over the last decades, tubewells have pumped many water tables dry, forcing vast areas to return to traditional, dryland farming or give up farming altogether (Sharma 2000). According to India's hydrologists, nearly a fifth of the sub-continent is withdrawing more water than is being replaced by rain. In the Punjab—home of the Green Revolution—nearly 80% of groundwater is now "overexploited or critical" (Sengupta 2006). This draw down may be irreversible. Because most of these grains are exported, the hydrological result of the Green Revolution packages is the sacrifice of India's ancient aquifers to the voracity of the international grain trade, a situation surely to become more critical given predicted climate change.

3. **The Green Revolution leads to the loss of agro-biodiversity, the basis for smallholder livelihood security and regional environmental sustainability.** *Diversity is an important nutritional resource of poor communities, but the spread of MVs was accompanied by loss of local crop varieties and a trend toward monoculture which reduced dietary diversity and increased malnutrition.*

The agricultural systems created by the Green Revolution are shockingly dependent on a handful of varieties for its major crops. For example, in the U.S. two decades ago, 60 to 70% of the total bean acreage was planted with two to three bean varieties, 72% of the potato acreage with four varieties, and 53% with three cotton varieties. As the industrial model was introduced into the developing world, agricultural diversity has been eroded as monoculture has started to dominate. For example, in Bangladesh the promotion of Green Revolution rice led to a loss of diversity including nearly 7,000 traditional rice varieties and many fish species. Similarly in the Philippines, the introduction of HYV rice displaced more than 300 traditional rice varieties that provided farmers with stable yields under low levels of technology and environmental uncertainty. Researchers have repeatedly warned about the extreme vulnerability associated with this genetic uniformity. Perhaps the most striking example of vulnerability associated with homogenous uniform agriculture was the collapse of Irish potato production in 1845, where the uniform stock of potatoes was highly susceptible to the blight, *Phytophthora infestans infestans*. Banana monoculture plantations in Costa Rica have been repeatedly and seriously jeopardized by diseases such as *Fusarium oxysporum* and yellow sigatoka. In the U.S., in the early 1970s, uniform high-yielding corn hybrids comprised about 70% of all the corn varieties; a 15% loss of the entire crop by leaf blight occurred in that decade. Uniform commercial potato in western industrial nations is currently threatened by late potato blight, the same fungus that caused the potato famine in Ireland. Late blight is jeopardizing the \$160 billion potato industry in the U.S., and is causing losses of up to 30% in Global South potato areas, and especially in those where potato diversity has been lost (Thrupp 1997).

The net effect of the Green Revolution package is to deplete natural fertility, increase pest damage, dry up aquifers and reduce agrobiodiversity. In doing so, the Green Revolution increases environmental risk and exacerbates the economic vulnerability of poor farmers.

4. **Hunger is not primarily due to a lack of food, but rather because the hungry are too poor to buy the food that is available.** *Nobel laureate Amartya Sen has shown that famine is fundamentally a problem of democracy, poverty and food distribution. While the architects of AGRA dutifully recite the Green Revolution's oft-trumpeted claims to success in raising agricultural yields, there is little understanding of the causes of hunger, or of the Green Revolution's colossal failure: it did not effectively reduce poverty or hunger.*

Nearly half of the African continent's 750 million people subsist on less than one dollar a day—nearly twice as many as a quarter century ago.^{ix} They are too poor to buy the food that is available but often poorly distributed, or they lack the land and resources to grow it themselves. AGRA claims that by raising yields, they will help the region's 180 million smallholders feed themselves and the rest of the Sub-Saharan poor (Rockefeller Foundation 2006). But a good food production-population ratio does not necessarily indicate that famine will not occur. Famines have occurred in Asia during periods of high agricultural output and were due to speculative stockpiling, unemployment, and low purchasing power—not food shortages. True, the Indian sub-continent went from being a chronic food importer to a massive grain exporter, but this did not keep 200 million Indians from going hungry in 1995 while the country exported \$625 million worth of wheat and flour and 5 million metric tons of rice. Even as recently as 2001, starvation deaths were reported in more than a dozen Indian states, despite the fact that India ranks near the top of agricultural exporters in the global south (Patel 2004). India's current 26 million-ton grain surplus could easily feed its 320 million

hungry people, but does not (Sharma 2000). Why? Because starving villagers are too poor to buy the food produced in their own countryside.

Serious questions are raised when we look at the number of hungry people in the world in 1970 and in 1990, spanning the two decades of major Green Revolution advances (Lappé et al., 1998). At first glance it looks as though great progress was made, with food production up and hunger down. The total food available per person in the world rose by 11 percent over those two decades, while the estimated number of hungry people fell from 942 million to 786 million, a 16 percent drop. This was apparent progress, for which those behind the Green Revolution were understandably happy to take the credit. But these figures merit a closer look. If you eliminate China from the analysis, the number of hungry people in the rest of the world actually increased by more than 11 percent, from 536 to 597 million. In South America, for example, while per capita food supplies rose almost 8 percent, the number of hungry people also went up, by 19 percent. It is essential to be clear on one point: It is not increased population that made for more hungry people—total food available per person actually increased—but rather the failure to address unequal access to food and food-producing resources. In South Asia there was 9 percent more food per person by 1990, but there were also 9 percent more hungry people. The remarkable difference in China, where the number of hungry dropped from 406 million to 189 million, almost begs the question: which was more effective at reducing hunger, the Green Revolution or the Chinese Revolution? The volume of output alone tells us little about hunger. Whether the Green Revolution or any other strategy to boost food production will alleviate hunger depends on the economic, political, and cultural rules that people make. Those rules determine who benefits as a supplier of the increased production (whose land and crops prosper and for whose profit) and who benefits as a consumer of the increased production (who gets the food and at what price).

5. **Without addressing structural inequities in the market and political systems, approaches relying on high input technologies fail.** *The growing hunger in Africa is largely due to the increased impoverishment of the very rural peoples who once grew food, but who have now left farming. Today's African farmers could easily produce far more food than they do, but they don't because they cannot get credit to cover production costs, nor can they find buyers or obtain fair prices to give them a minimal profit margin. Under such circumstances, what difference will a new "technology package" make? Without addressing the causes of why African farmers leave farming—or why they under-produce—AGRA will have little impact on this trend.*

Rural Africa has been devastated by 25 years of corporate globalization's free trade and anti-peasant policies imposed on the continent's governments by the World Bank, the IMF, the WTO, the U.S. and the E.U. (Rosset, 2006a, and deGrassi and Rosset, forthcoming).^x The forced privatization of food crop marketing boards – which though flawed, once guaranteed African farmers minimum prices, and held food reserves for emergencies – and rural development banks, which gave farmers credit to produce food, have left farmers without financing to grow food or buyers for their produce. Free trade agreements have made it easier for private traders—the only buyers and sellers of food who are left—to import subsidized food from the U.S. and the E.U. than to negotiate with thousands of local farmers. This amounts to “dumping” which drives local farm prices below the costs of production and drives local farmers out of business.^{xi} The failures of the Green Revolution have taught us that sustainable rural development is not just about increasing yields—it requires the redistribution of land and resources, a fair and stable market, and sound agroecological management. These are the very aspects of agricultural development that are ignored or undermined by the Green Revolution.

6. **The private sector alone will not solve the problems of production, marketing and distribution** *The first Green Revolution was introduced through the massive institutional*

support systems of the Indian and Mexican development states. Government agricultural ministries provided training, credit, research and extension, marketing, processing and distribution services to farmers who adopted Green Revolution technology. These heavy state subsidies created a market for private sector entry into the seed, fertilizer, machinery and trade activities in the Green Revolution. Few of these services are remotely available today.^{xiii}

Today, World Bank/IMF structural adjustment programs have forced governments in the Global South to slash their basic services and gut their agricultural ministries (Rosset, 2006a,b; deGrassi and Rosset, forthcoming). There are next to no professional or technical staff for national agricultural research and extension. There are no trucks to carry technicians to the field (and no budget for gasoline, even if there were). Agricultural extension is reserved for large plantations that can pay for private technicians. The Rockefeller Foundation's notion that small rural shopkeepers will somehow provide farmers with the agronomic technical assistance needed to maintain complex integrated soil management programs, crop improvement, or stable marketing environments is ludicrous. At best, these salesmen will assist a handful of foreign companies to increase sales of expensive, unnecessary, damaging and dangerous fertilizers, pesticides and herbicides, and to sell cheap foreign grains to local populations, further undercutting local farmers in their home markets.

- 7. Introduction of genetic engineering—the driving force behind AGRA initiative—will make smallholder systems more environmentally vulnerable in Sub-Saharan Africa.** *AGRA's directors openly admit that their conventional crop-breeding approach will pave the way for genetic engineering technology. Both the Gates^{xiii} and the Rockefeller Foundations^{xiv} are actively financing projects in genetic engineering (Bill Gates also has substantial private investments in GE^{xv}). However, GE increases the risks of environmental failure on smallholder farms:*

The expansion of transgenic maize and soybean monocultures in Africa will not only narrow the genetic base of indigenous agriculture but will also cause environmental risks. There are many widely accepted environmental risks associated with the rapid deployment and widespread commercialization of genetically engineered (GE) crops (Altieri, 2004; Altieri et al 2005; Altieri and Rosset, 1999a,b; Independent Science Panel, 2003):

- a. the spread of transgenes from GE crops to related weeds via crop-weed hybridization enhancing the fitness of sexually compatible wild relatives leading to development of weed species resistant to herbicides;
- b. reduction of the fitness of non-target organisms (especially local varieties) through the acquisition of transgenic traits via hybridization;
- c. the rapid evolution of resistance of insect pests—such as the stem borer—to Bt (*Bacillus thuringiensis*);
- d. accumulation of the insecticidal Bt toxin, which remains active in the soil after the crop is ploughed under and binds tightly to clays and humic acids with unknown effects on soil biota;
- e. disruption of natural control of insect pests through intertrophic-level effects of the Bt toxin on natural enemies;
- f. Herbicide resistant crops can also indirectly affect soil biota through effects of glyphosate that appears to act as an antibiotic in the soil inhibiting mycorrhizae, antagonists and nitrogen fixing bacteria. Scientists have shown that root development, nodulation and nitrogen fixation is impaired in some transgenic soybean varieties that exhibit lower yields, and that effects are worse under drought stress or infertile soils;
- g. unanticipated effects on non-target herbivorous insects (i.e. monarch butterflies) through deposition of transgenic pollen on foliage of surrounding wild vegetation);

- h. vector-mediated horizontal gene transfer and recombination to create new pathogenic organisms, and;
- i. contamination of non-GE crop varieties, with the added risk that this contamination may contribute to the genetic deterioration of local crop varieties that are critical to food security.

When transgenic varieties are used in the complex, diverse and risk-prone cropping systems of peasant farmers, the risks are much greater than in large, wealthy farmer systems, or farming systems in Northern countries. The widespread crop failures reported for transgenics due to stem splitting, boll drop, etc., pose economic risks that can affect poor farmers much more severely than wealthy farmers. If consumers reject their products, the economic risks are higher the poorer one is. Also, the high costs of transgenics introduce an additional anti-poor bias into the system (see next topic below). The most common transgenic varieties available today are those that tolerate proprietary brands of herbicides, and those that contain insecticide genes. Herbicide tolerant crops make little sense to peasant farmers who plant diverse mixtures of crop and fodder species, as such chemicals would destroy key components of their cropping systems. Transgenic plants which produce their own insecticides, usually using the 'Bt' gene, closely follow the pesticide paradigm, which is itself rapidly failing due to pest resistance to insecticides. Instead of the failed "one pest-one chemical" model, genetic engineering emphasizes a "one pest-one gene" approach, shown over and over again in laboratory trials to fail, as pest species rapidly adapt and develop resistance to the insecticide present in the plant. Bt crops violate the basic and widely accepted principle of "integrated pest management" (IPM), which is that reliance on any single pest management technology tends to trigger shifts in pest species or the evolution of resistance through one or more mechanisms. In general, the greater the selection pressure across time and space, the quicker and more profound the pests' evolutionary response. Thus IPM approaches employ multiple pest control mechanisms, and use pesticides minimally, only in cases of last resort. An obvious reason for adopting this principle is that it reduces pest exposure to pesticides, retarding the evolution of resistance. But when the product is engineered into the plant itself, pest exposure leaps from minimal and occasional to massive and continuous, dramatically accelerating resistance. Most entomologists agree that Bt will rapidly become useless, both as a feature of the new seeds and as an old standby natural insecticide sprayed when needed by farmers that want out of the pesticide treadmill. In the U.S., the Environmental Protection Agency has mandated that farmers set aside a certain proportion of their area as a 'refuge,' where non-Bt varieties are to be planted, in order to slow down the rate of evolution by insects of resistance. Yet it is impossible for poor, small farmers in the Global South to set aside precious land for such refuges, meaning that resistance to Bt could occur much more rapidly under such circumstances.

8. **The introduction of GE crops into smallholder agriculture will likely lead to farmer indebtedness.** *The expansion of GE crops in the Global South is driven by powerful transnational corporations that—in the face of growing public rejection of GE foods in the industrialized world—are desperately attempting to expand their markets in the Global South. While touted as the latest “silver bullet” in the war against hunger, GE crops will likely impoverish poor farmers by making them dependent on expensive external inputs:*

Genetically engineered crops create opportunities for transnational corporations to control and profit from every step of the smallholder production processes. Smallholders will lose their agroecological flexibility in fertilizing, controlling weeds or managing pests because these production steps will all be contained within the genetic information of the GE seeds distributed to them. Contamination of non-GE crops by GE neighbors is impossible to control on the small plots cultivated by African farmers. The problem with introducing transgenic crops into high diversity regions is that the spread of characteristics of genetically

altered grain to local varieties favored by small farmers could dilute the natural sustainability of these races (Jordan 2001). Once GE is introduced to a region dominated by smallholders, all farmers will eventually have to adopt, or pay heavy fines to seed companies for “stealing” the genetic material that crosses over into their fields.^{xvi} Under these circumstances, smallholders’ dependence on GE will lead to the enrichment of transnational seed, fertilizer and herbicide companies—not the end of hunger.

9. **AGRA’s assertion that “There Is No Alternative” (TINA) ignores the many successful agroecological and non-corporate approaches to agricultural development that have grown in the wake of the Green Revolution’s failures.** *Truly reducing hunger requires policy changes that are far more important than technology fixes. To use crude economics language, we could say that any “supply side” (i.e. seeds and fertilizers) approach is useless until “demand side” problems (fair prices) are resolved. At best, the “right technology” plays only a complementary role. In this context, only agroecological technologies that have positive effects on the distribution of wealth, income, and assets, that are pro-poor, can have a synergistic effect in the reduction of hunger. Thousands of examples of the application of agroecology are at work throughout the developing world, where yields for crops that the poor rely on most—rice, beans, maize, cassava, potatoes, barley—have been increased by several-fold, relying on local biodiversity, family labor and new and traditional agroecological knowledge.*

There are many successful agroecological options and economic alternatives for sustainable production that have grown up in response to the failures of the Green Revolution (see, for example, Altieri, 1995; Altieri and Nicholls, 2005). Across Africa, Latin America and Asia, farmer-to-farmer movements, farmer-led research teams, and farmer field schools have already discovered how to raise yields, distribute benefits, protect soils, conserve water and enhance agro-biodiversity on hundreds of thousands of smallholdings in spite of the Green Revolution (see Holt-Gimenez, 2006, for an excellent example). A survey of 45 sustainable agriculture projects/initiatives spread across 17 African countries covering some 730,000 households, revealed that agroecological approaches substantially improved food production and household food security. In 95% of the projects, cereal yields improved by 50–100%. Total farm food production increased in all projects. The additional positive impacts on natural, social and human capital are also helping to build the assets base to sustain these improvements in the future (Pretty 2004). This analysis indicates that sustainable agriculture can deliver large increases in food production in Africa. There is no question that small farmers in Africa can produce all of their needed food and surpluses for market. The evidence is conclusive: new approaches and technologies spearheaded by farmers around Africa are already making a sufficient contribution to food security at the household, national, and regional levels. A variety of agroecological and participatory approaches in many countries show very positive outcomes even under adverse conditions. With appropriate support the spread of these approaches to thousands of other farm households can contribute to food sovereignty rather than corporate dependency. This will require substantial policy and institutional changes, as well as strategic philanthropic support from visionaries who will dare to put their millions in the hands of progressive social movements. Sadly, the two Foundations have chosen to ignore them and push their own pro-corporate agenda.

10. **AGRA’s “alliance” does not allow peasant farmers to be the principal actors in agricultural improvement.** *The Rockefeller and Gates Foundations consulted with the world’s largest seed and fertilizer companies, with big philanthropy, and with multilateral development agencies, but have yet to let peasant farmer organizations give their views on the kind of agricultural development they believe will most benefit them.*

Through Via Campesina (<http://www.viacampesina.org>), peasant and small farmer organizations from Africa and around the world are debating and formulating the policy changes needed to truly reverse the policy-driven collapse of peasant agriculture in Africa and other continents. These policies, including a step-back from free trade extremism and market fundamentalism, plus increased supports for family farmers, improved access to farmland, water and local seeds for the poor, and ecological farming methods, are together called *Food Sovereignty* (Via Campesina et al., undated; Rosset, 2003). Their February 2007 World Forum for Food Sovereignty in Mali, which includes African consumer and environmental groups as well, marks a key point in this process.^{xvii} Without such changes, no farming technology—especially chemical and genetically-engineered based—can truly address hunger. In contrast to the Gates/Rockefeller approach, creating such a favorable policy environment for family agriculture will make it possible for the hungry to feed themselves using sustainable, ecologically-sound farming methods, create rural employment *and* produce a surplus, critical for the food security of local populations.

The concept of food sovereignty was developed by La Via Campesina, and brought to the public debate during the World Food Summit in 1996 as an alternative framework for food and agriculture. Since that time the concept has gained tremendous popularity and echo in civil society sectors of nations both North and South, and has been developed into a holistic and internally coherent alternative framework (Rosset, 2006a). Food Sovereignty proponents argue that food and farming are about more than trade, and that production for local and national markets is more important than production for export from the perspectives of: broad-based and inclusive local and national economic development, for addressing poverty and hunger, preserving rural life, economies and environments, and for managing natural resources in a sustainable fashion. They argue that every country and people must have the right and the ability to define their own food, farming, and agricultural policies that they need to have the right to protect local markets, and to have public sector budgets for agriculture that may include subsidies that do not lead to greater production, exports, dumping and damage to other countries. Given that, the farming peoples of every country on Earth (with the exception of some city-states) have the ability to feed their nations' peoples, and feed them well. They believe that low prices are the worst force that farmers face everywhere in the world, and therefore that we need to effectively ban dumping, to apply anti-monopoly rules nationally and globally, to effectively regulate over-production in the large agro-export countries, and to eliminate the kinds of direct and in-direct, open and hidden subsidies that enforce low prices and overproduction. In other words, that we need to move from mechanisms that enforce low prices to those that would promote fair prices for farmers and consumers alike. This alternative model also includes agrarian reform, with limits on maximum farm size, equitable local control over resources like seeds, land, water and forests, and is opposed to patenting seeds. The food sovereignty approach is being taken increasingly seriously by other sectors, such as organizations representing consumers, urban poor, indigenous peoples, trade unions, environmentalists, and human rights activists, and by researchers and other experts, and forms the basis for collaboration between the Food and Agriculture Organization (FAO) of the UN and farmer groups and other civil society actors, as announced by FAO Secretary General Jacques Diouf at the 2002 World Food Summit.

If the Gates and Rockefeller Foundations truly want to end hunger and poverty in rural Africa, then they should put their millions in the service of the struggle by peasant and farmer organizations, and their allies, to truly achieve food sovereignty.

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ⁱ See <http://www.gatesfoundation.org/GlobalDevelopment/Agriculture/default.htm> and <http://www.rockfound.org/Agriculture/Announcement/218> for the “official versions,” and <http://www.nytimes.com/2006/09/13/us/13gates.html?ex=1315800000&en=af519c353b629e46&ei=5088&partner=rssnyt&emc=rss>, http://seattletimes.nwsourc.com/html/localnews/2003256312_gates13.html and <http://www.washingtonpost.com/wp-dyn/content/article/2006/09/12/AR2006091201384.html> for examples of the media coverage the announcement received.

ⁱⁱ For example, Rosset, 2006b, GRAIN, 2006, and http://seattletimes.nwsourc.com/html/localnews/2003256312_gates13.html.

ⁱⁱⁱ See <http://www.grain.org/articles/?id=19>

^{iv} Consultative Group on International Agricultural Research, <http://www.cgiar.org>

^v Where statements are not independently cited, they come from Lappé et al, 1998, and/or from deGrassi and Rosset, forthcoming.

^{vi} Green Revolution packages ended up indebting the smallholder majority, many of whom were eventually pushed into landlessness and poverty. According to the Indian government, between 1993 and 2003, over 100,000 bankrupt Indian farmers committed suicide. Since then India has averaged 16,000 farmer suicides a year—usually by drinking Green Revolution pesticides. In the Punjab, the Green Revolution “showcase”, the government admits to over 2,000 farmer suicides (Devinder Sharma, “Farmer Suicides” *Third World Resurgence*, No. 191, July 2006 and Pankaj Mishra, “The Myth of the New India,” *The New York Times*, 6 July, 2006). It’s not that these farmers missed out on the Green Revolution. On the contrary, their destitution and desperation are the *result* of the Green Revolution.

^{vii} AGRA’s claim that introducing chemical fertilizers to sub-Saharan Africa will improve the natural fertility of the region’s soils is not only disturbing, it flies in the face of science, experience, and plain common sense. Soils in the tropics quickly lose their organic matter under Green Revolution fertilization regimes. Yields drop precipitously, requiring higher and higher chemical applications until fertilization costs outweigh yield benefits. By then the soil is biologically dead and must be painstakingly reclaimed by adding large amounts of organic matter in order to be productive.

^{viii} In the past 50 years the use of pesticides in agriculture has increased dramatically worldwide and now amounts to some 2.56 billion kg./year. Unfortunately, the increase in pest outbreaks has increased just as rapidly. In the early 21st century the annual value of the global market was US\$ 25 billion. In the U.S. approximately 324 million kg of 600 different types of pesticides are used annually at a cost of no less than \$4.1 billion. The indirect costs of pesticide use to the environment and public health have to be balanced against their benefits. Based on the available data, the environmental costs (impacts on wildlife, pollinators, natural enemies, fisheries, water and development of resistance) and social costs (human poisonings and illnesses) of pesticide use in the USA reach about \$8 billion each year. The environmental costs are far worst in the developing world where pesticides banned in the USA and Europe are still used. These are clear signs that the pesticide-based approach to pest control has reached its limits and AGRA ignores this historical fact.

^{ix} See <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,menuPK:258651~pagePK:146732~piPK:64003010~theSitePK:258644,00.html>

^x The World Bank is the largest development assistance provider to Africa in the world (Ibid). The Bank's private sector lending arm—the International Finance Corporation (IFC) is the largest multilateral source of financing for private sector projects in Africa (<http://www.ifc.org/ifcext/about.nsf/Content/Regions>). This aid has contributed to the crippling debt burdens facing most African countries today. This debt forces them to focus on export crops—rather than food—to obtain the dollars they need to pay interest on these loans.

^{xi} Not only was the Rockefeller Foundation misguided about the true causes of hunger when they initiated the first Green Revolution, but they assumed that progress and development in traditional agriculture inevitably required the replacement of local crop varieties by improved ones which in order to perform required agrochemicals. They also assumed that the economic and technological integration of small farming systems into the global system is a positive step that enables increased production, income and social well being.

^{xii} Indeed, it made the private sector quite rich.

^{xiii} See <http://www.gatesfoundation.org>

^{xiv} See <http://www.rockfound.org>

^{xv} Krebs, 2006.

^{xvi} “To date, Monsanto has filed 90 lawsuits against American farmers. The lawsuits involve 147 farmers and 39 small businesses or farm companies, and have been directed at farmers residing in half of the states in the U.S. The odds are clearly stacked against the farmer: Monsanto has an annual budget of \$10 million dollars and a staff of 75 devoted *solely* to investigating and prosecuting farmers. The largest recorded judgment made thus far in favor of Monsanto as a result of a farmer lawsuit is \$3,052,800.00. Total recorded judgments granted to Monsanto for lawsuits amount to \$15,253,602.82. Farmers have paid a mean of \$412,259.54 for cases with recorded judgments.” (Introduction, “Monsanto vs US Farmers”, Center for Food Safety, 2004, <http://www.centerforfoodsafety.org/Monsantovsusfarmersreport.cfm>)

^{xvii} See <http://www.nyeleni2007.org>

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