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Smallholder-led Sustainable Agriculture

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Smallholder sustainable agriculture is the most efficient and socially just way to increase productivity, resilience to climate change, household incomes, job creation, regeneration of land and other natural resources, and improvements in household food security.

- The G20 should ensure donors deliver on their commitments to the L'Aquila Food Security Initiative (AFSI) and the Global Agriculture & Food Security Program (GAFSP). A major portion of these funds should target smallholder-led climate-resilient sustainable agriculture.
- The G20 should prioritize investment in sustainable agriculture, ensuring public research, extension and credit facilities, particularly for women farmers. The research, including that of the CGIAR system, should support and build on initiatives by farming communities and civil society.
- The G20 should support national governments and regional bodies to overhaul and expand extension systems to reach more smallholders and support their climate-resilient sustainable agriculture initiatives.

Background

Volatile food prices, recurrent droughts, floods, soil and water degradation, and land grabs are some of the multiple challenges faced by food production in poor countries. Three-quarters of the world's poor and 70% of hungry people live in rural communities¹ where smallholder farming is the predominant livelihood and source of food.^{2, 3} Small-scale producers⁴ provide more than half of the world's food supply.⁵ They contribute over 90% of Africa's agricultural production, and the majority of the maize, beans and potatoes for domestic consumption in Latin America.^{6,7}

Approximately 2.5 billion people in poor countries live directly from agriculture – farming crops and livestock or relying on forestry or fisheries⁸ – and 1.5 billion people live in smallholder households.⁹ Women are a substantial majority of the agricultural workforce and produce most of the food that is consumed locally.¹⁰ Of an estimated 525 million farms worldwide, about 404 million are small farms with two hectares of land or less.¹¹ Smallholders feed poor communities – including themselves – and small increases in yields on their farms could have a profound impact on poverty and access to food at the local and regional levels.^{12,13}

For these people – about a third of the world's population -- there is simply no alternative to supporting affordable, sustainable, climate-resilient agricultural approaches that fit existing cultural and economic systems.

Importance of smallholder-led climate resilient sustainable agriculture

ActionAid believes sustainable smallholder agriculture offers a key solution to tackling hunger, as well as addressing poverty and climate change issues.

Sustainable agriculture¹⁴ integrates several goals like environmental stewardship, farm profitability and prosperous farming communities. It refers to the ability of farms to produce food indefinitely, without damaging soils and ecosystems, or human and social capital¹⁵. Sustainable approaches aim to maintain healthy soils while reducing reliance on external 'inputs' such as fertilisers, pesticides and herbicides.

Sustainable agriculture encompasses approaches such as agro-ecology, low external input, agro-forestry, organic agriculture, integrated crop and pest management and water harvesting in dry land areas. These approaches often blend farmers' traditional and local experience with scientific knowledge and innovation aimed at ensuring access to healthy and nutritious food throughout the year. As it relies on local renewable resources and locally-based innovation, sustainable agriculture is particularly well-suited to poor, remote or marginalised communities.

Feeding the future

Climate change, water scarcity, high energy prices, desertification, land degradation (such as saline soils), and cropland losses due to biofuels, timber, expanding cities and other factors,¹⁶ will make it harder for humanity¹⁷ to feed itself. With populations projected to rise from 6.7 to 9.2 billion by 2050,¹⁸ producers will be very challenged¹⁹ to meet demand for food, feed, fiber and biofuels, and changes in diets towards more meat and dairy.^{20,21}

Global modeling suggests sustainable agriculture could produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base.²² To achieve this, United Nations Environment Program (UNEP) advocates a switch to sustainable agriculture. It also recommends reducing large food losses in the field in poor countries, recycling waste in the food chain, and finding alternatives for animal feed (eg from plant waste or fish discard). Together, these changes could feed an additional three billion people by 2050.²³

Mounting evidence²⁴ shows sustainable agriculture is productive

Questions are often raised about the productivity of sustainable agriculture and its validity at a large scale. The following examples show increased and sustainable productivity in developing countries on a reasonably large scale.

The largest study examining smallholder sustainable agriculture in poor countries analysed 286 projects covering 37 million hectares (3 per cent of the cultivated area in developing countries) in 57 countries. The study found that sustainable agriculture resulted in increased average crop yields of 79% in 12.6 million farms.²⁵ Some 4.42 million cereal-growing small farmers reaped 73% higher production, providing an additional 1.7 tonnes per household per year. Some 146,000 farmers growing potato, sweet potato, and cassava achieved 150 % higher production on 542,000 hectares.

This database of 286 projects was re-analysed by UNCTAD and UNEP to produce a summary of the impacts in 114 projects throughout Africa. It found that sustainable agriculture improved crop yields by an average of 116% for all African projects and 128% for projects in East Africa.²⁶

Research commissioned by the Foresight Global Food and Farming Futures project of the UK Government reviewed 40 sustainable agriculture projects developed during the 2000s in 20 African countries. By early 2010, the projects had recorded significant benefits for 10.39 million farming families and improvements on nearly 12.75 million hectares. Crop yields more than doubled over a period of 3-10 years, resulting in an increase in aggregate food production of 5.79 million tonnes per year, equal to 557 kg per farming household.²⁷

High-input farming, largely based on chemical fertilisers and pesticides, accounts for an estimated 15% of global emissions of greenhouse gases (GHG) such as carbon dioxide, nitrous oxide and methane.²⁸ At the same time climate change is projected to have a devastating impact on food production and food security. The Intergovernmental Panel on Climate Change (IPCC) says yields from rain-fed farming in some African countries could fall by up to 50% by 2020, and by up to 30% in some central and South Asian countries by 2050.²⁹

Sustainable agriculture and climate change mitigation and adaptation

Sustainable agriculture can mitigate climate change through carbon sequestration and offers a genuinely low GHG emission alternative.³⁰ The FAO says sustainable agriculture has huge potential to sequester carbon dioxide from the atmosphere, and that organic agriculture can reduce GHG emissions because it requires 25-50% less energy compared to conventional chemical-based agriculture.³¹

Agroecological techniques can significantly cushion the negative impacts of climate change and develop resilience in the farming system. For instance after Hurricane Mitch (1998) in Nicaragua, a study of 180 communities of smallholders highlighted that farming plots cropped with simple agroecological methods (like rock bunds or dikes, green manure, crop rotation and the incorporation of stubble, ditches, terraces, barriers, mulch, legumes, trees, plowing parallel to the slope, no-burn, live fences, and zero-tillage) yielded on average 40 per cent more topsoil, higher soil moisture, less erosion and lower economic losses compared with conventional farms. On average, agroecological plots lost 18 per cent less land to landslides than conventional plots and had 69 per cent less erosion compared to conventional farms.³²

Sustainable agriculture helps build resilience

Moreover, in Tanzania, 350,000 hectares of land have been rehabilitated in the Western provinces of Shinyanga and Tabora using agroforestry.³³ In Malawi, Mozambique and Zambia,³⁴ water harvesting in dryland areas resulted in the cultivation of formerly abandoned degraded lands, and improvement in water productivity of crops. In West Africa, techniques like stone barriers built alongside fields can slow water runoff during the rainy season, causing improvements in soil moisture, replenishment of water tables, and reduction in soil erosion. The water retention capacity of soil is improved five- to ten-fold while the biomass production multiplies by 10 to 15 times. Besides, livestock can feed on the grass grown - after the rains - along the stone barriers.³⁵

More frequent and severe droughts, floods and extreme weathers are now hitting the world. Agroecological farming can play a major role in such circumstances. Agroforestry in Malawi helped in avoiding crop failure after droughts, due to improved soil filtration.³⁶ Nearly 12,500 farm households in drought-prone Cheha in southeast Ethiopia have benefited by introducing new

types of crops (such as vegetables), trees (fruit and forest), and organic manures for soil fertility, natural pest controls and veterinary services. This has resulted in a 60% increase in crop yields, a 70% improvement in overall nutrition levels, and the area now enjoys surplus food production.³⁷ Other experiments in India, the Netherlands, and Ethiopia have shown that physical properties of soils of organic farms improved the drought resistance in crops.³⁸

Sustainable agriculture addresses the food/energy/climate change nexus

The globalization of the food system has created an increased dependency on oil-intensive industrial monocropping and heavy processing of food in wealthy countries. Not only does this approach increase GHG emissions but it puts pressure on energy sources at a time when the world is increasingly aware of oil as a finite resource and oil prices have become extremely volatile. Many governments have tried to address their need for greater energy security, rural development, and environmental sustainability by increasing production and use of biofuels, in the belief that they will be a “renewable” energy source.

There is growing evidence, however, that conventional industrial biofuels are worse for the environment than the fossil fuels they were intended to replace. An examination of the full process of biofuel production reveals that while small-scale biofuel production for local consumption can be accomplished sustainably and support rural development, industrial biofuel cultivation for mass consumption has resulted in land grabbing and both direct and indirect land use change that has put more pressure on food stocks and led to rising prices and declining food security. Growing demand for biofuels will only increase the production challenges as world population grows. Instead of trying to replace oil with food, getting the oil *out* of our food through greater investment in sustainable agriculture can go much further in resolving the triple challenge of agriculture, climate change, and energy.

Multi-functional role of sustainable agriculture

There is an emerging consensus that recognising the ‘multi-functional’ role of agriculture – meaning its multiple benefits: food, fiber, medicines, livelihoods, cultural heritage, water, and environmental services – and strengthening the ability of smallholders to build more resilient and

sustainable agriculture systems is a crucial response to the global food, water and climate crisis.³⁹

Building political and policy support for climate-resilient sustainable agriculture

Political support for climate-resilient sustainable agriculture lags far behind the growing evidence of the negative impacts of chemical-based conventional agriculture. One of the reasons is the way the current food and agricultural system is designed and the prevailing mindset – and financial and political clout -- of those who run it. Current food and agricultural system rewards homogenized, top-down, uniform solutions that can achieve scale and are commercially viable.

With its dependence on fossil fuels, modern industrial agriculture has broken the ecology-farming linkage. This situation was aggravated by several national and international policies that favored large farm size, specialized production, crop monocultures, and mechanization. Today, just 15 crops provide 90 per cent of the world's food energy intake, rendering the global food system highly vulnerable to shocks. Fertilizers, water and pesticides are overused, leading to soil erosion, desertification, pollution and salinization. Excessive irrigation doubled the shrinkage rate of global groundwater stocks between 1960 and 2000. The system is designed to be commercially profitable instead of fulfilling food needs or reducing poverty.^{40,41,42,43}

The whole agricultural system needs major reform to focus on smallholder sustainable agriculture across the board. Such reforms, in addition to having a focus on smallholder farmers, must have strong emphases on gender, sustainability, and equity.

Reforming agricultural research systems

The existing agricultural research system is largely based on conventional chemical-based agriculture, targeting a small number of crops⁴⁴ and fails to sufficiently prioritize approaches that could help minimize the breakdown in agro-ecological functions⁴⁵. Nearly half of the scientists in developing countries work mainly on cereals.⁴⁶

According to the FAO, 'Public sector plant breeding has continued to shrink, and in some cases the private sector is taking over. This has implications for smallholder subsistence farmers: the private sector largely focuses on only a few crops for which farmers buy seeds each season and often these are not the crops that are the basis of food security in most developing countries'⁴⁷.

Many research projects produce results in isolated and controlled environments and expect to replicate them in diverse contexts. Traditional wisdom and farmers' experience and knowledge are not considered important for integration in the research system. But these sterile research methods often produce dead ends; agriculture research requires engagement with real-world conditions every step of the way.

The participation of farmers is vital for the success of agro-ecological practices, as they have been developed by grassroots organizations and NGOs, and it has spread through farmer field schools and farmers' movements^{48,49}. The demonstration farms managed by farmers attract more attention from other farmers. Moreover, the partnerships between farming communities and national research systems in Tanzania, Uganda and Ethiopia have fostered better adaptations.⁵⁰

Investment in knowledge building is essential to expand the successes of sustainable agriculture. Hence, the existing global, regional and national research systems should be reformed to shift their focus to sustainable methods and technologies. Farmers' knowledge and experience, and the work of CSOs and non-governmental think tanks should be respected and integrated into the research systems. The outcomes of research and the innovations should be freely available to smallholder farmers without any constraints of copyrights or patents.

The International Food Policy Research Institute (IFPRI) highlights the example of Kenya to show that a combination of effective research and extension services can provide the greatest returns to spending: – for every million Kenyan shillings (about \$13,000) spent, an additional 103 people could be lifted above the poverty line.⁵¹ However such changes are not possible unless research findings are converted into concerted actions. For instance, International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) report, completed in 2008, is the most respected and rigorous piece of agricultural research in recent years, with the contribution of 400 highly respected researchers collected in over 2000 pages

over a four-year period, but despite its official sponsorship by the top international organizations, its findings, which support sustainable agriculture approaches, continue to be neglected.

Reforming extension services

Agricultural extension services are fundamental in building farmers' knowledge and capacity for better crop and resource management. Nevertheless, both the quality and quantity of extension services have suffered in the last two decades. For instance, in Malawi only 13 percent men farmers receive extension advice. The situation of women farmers is even worse, as only 7 per cent of female-headed households receive some advice from extension workers⁵².

Like the research system, existing extension services are also based on conventional chemical-based agriculture with a focus on a few crops. *A smallholder farmer from Kenya William Kiprop, quoted in Fertile Ground report*⁵³ says, "No extension officer has ever come to recommend to us the varieties of maize seeds that suit our soils and environmental conditions. We see them walking around taking their notes, but they never engage with us."

Extension systems need to be reformed starting with building staff capacity on sustainable agricultural methods and technologies. A survey conducted in Malawi reported 84% of the extension staff's dissatisfaction with the training they had received.⁵⁴ Extension staff should also be trained in respecting and learning from farmers' knowledge for an interactive capacity building program. Community members should participate in the design, execution, monitoring and evaluation of the extension program.

To support diverse solutions on diverse farms, the agricultural research and extension systems need to be reformed and decentralized, with farmers and local communities in the driving seat. The above reforms are not possible unless public investment and donor funding prioritizes sustainable agriculture. The IAASTD concludes that investment in sustainable and agro-ecological farming makes agriculture more resilient, adaptive and capable of eliminating hunger and rural poverty besides increasing yields.⁵⁵ The IAASTD also calls for research which includes "more and different stakeholders" including civil society and community organizations, and "trans-disciplinary approaches which integrate also traditional knowledge."⁵⁶

Recommendations for the G20 Agriculture Ministers and Leaders meeting in 2011:

- The G20 should ensure donors deliver on their commitments to the L'Aquila Food Security Initiative (AFSI) and the Global Agriculture & Food Security Program (GAFSP). A major portion of these funds should target smallholder-led climate-resilient sustainable agriculture
- The G20 should prioritize investment in sustainable agriculture, ensuring public research, extension and credit facilities, particularly for women farmers. The research, including that of the CGIAR system, should support and build on initiatives by farming communities and civil society
- The G20 should support national governments and regional bodies to overhaul and expand extension systems to reach more smallholders and support their climate-resilient sustainable agriculture initiatives.

Notes

¹ World Bank (2007) *World development report 2008: Agriculture for Development.*, Washington: World Bank

² World Bank (2007) *World development report 2008: Agriculture for Development.*, Washington: World Bank

³ High-Level task force on the global food security crisis (2008) *Comprehensive framework for action*, see: <http://www.un.org/issues/food/taskforce/Documentation/CFA%20Web.pdf>

⁴ Small-scale producers include family farmers, herders and pastoralists, landless and rural workers, forest dwellers, fisherfolk, gardeners, indigenous peoples and hunters and gatherers

⁵ Altieri, M (2009) *Small farms as a planetary ecological asset: five key reasons why we should support the revitalisation of small farms in the global south*, Penang: Third World Network

⁶ Nagayets, O (2005) *Small farms: current status and key trends. Information brief prepared for the future of small farms research workshop Wye college*, June 2005. Washington DC: International Food Policy Research Institute

⁷ Altieri, M (2009) *Small farms as a planetary ecological asset: five key reasons why we should support the revitalisation of small farms in the global south*, Penang: Third World Network

⁸ Pimbert M (2009) *Towards food sovereignty: reclaiming autonomous food systems*, London: International Institute for Environment and Development, see: <http://www.iied.org/natural-resources/key-issues/food-and-agriculture/multimedia-publication-towards-food-sovereignty-reclaiming-autonomous-food-sys>

⁹ World Bank (2007) *World development report 2008: Agriculture for Development.*, Washington: World Bank

¹⁰ World Bank (2009) *Gender in agriculture sourcebook*, Washington: World Bank

¹¹ IAASTD (2008) *Agriculture at a crossroads*, International assessment of agricultural knowledge, science and technology for development. Washington DC: IAASTD. See: <http://www.agassessment.org>

¹² Altieri, M (2009) *Small farms as a planetary ecological asset: five key reasons why we should support the revitalisation of small farms in the global south*, Penang: Third World Network

¹³ World Bank (2007) *World development report 2008: Agriculture for Development.*, Washington: World Bank

¹⁴ Sustainable agriculture can be defined as

“A whole-systems approach to food, feed, and fiber production that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. It combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. Inherent in this definition is the idea that sustainability must be extended not only globally but indefinitely in time and to all living organisms including humans” Adapted from - An Ecological Definition of Sustainable Agriculture, by Professor Stephen R. Gliessman and IFOAM's definition of organic agriculture.

¹⁵ UNCTAD/UNEP (2008) *Organic agriculture and food security in Africa*, New York: United Nations, see: http://www.unctad.org/en/docs/ditcted200715_en.pdf

¹⁶ Chatham House (2009) *The feeding of the nine billion*, London: Chatham House

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- ¹⁷ UNEP (2009) *The environmental food crisis*, see http://www.unep.org/publications/search/pub_details_s.asp?ID=4019
- ¹⁸ UN Population Division (2008) United Nations, Department of Economic and Social Affairs
- ¹⁹ 'Farming must change to feed the world' FAO press release, 4 February 2009, see: <http://www.fao.org/news/story/en/item/9962/icode>
- ²⁰ IAASTD (2008) *Agriculture at a crossroads*, International assessment of agricultural knowledge, science and technology for development. Washington DC: IAASTD.
- ²¹ UNEP (2009) *The environmental food crisis*, see http://www.unep.org/publications/search/pub_details_s.asp?ID=4019
- ²² Badgley, C *et al* (2007) *Organic agriculture and the global food supply*, Renewable agriculture and food systems, Cambridge University Press
- ²³ UNEP (2009) *The environmental food crisis*, Nairobi: UNEP, see http://www.unep.org/publications/search/pub_details_s.asp?ID=4019
- ²⁴ A host of recent high-level reports endorse the multiple benefits of smallholder-based sustainable agriculture, including from the UN Food and Agriculture Organization (FAO),²⁴ the UN Environment Programme (UNEP),²⁴ the UN Conference on Trade and Development (UNCTAD),²⁴ the UN/World Bank-sponsored International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)²⁴ and more recently '[Agroecology and the right to food](#)'²⁴ a compilation by Olivier Deschutter, UN Special Rapporteur on the Right to Food.
- ²⁵ Pretty, J *et al* (2006) *Resource-conserving agriculture increases yields in developing countries*, *Environmental Science and Technology (Policy Analysis)*
- ²⁶ UNCTAD/UNEP (2008) *Organic agriculture and food security in Africa*, New York: United Nations, see: http://www.unctad.org/en/docs/ditcted200715_en.pdf
- ²⁷ Pretty, J *et al.*, "Sustainable intensification in African agriculture," *International Journal of Agricultural Sustainability*, 9:1, forthcoming in 2011. Cited in '[Agroecology and the right to food](#)' a compilation by Olivier Deschutter, UN Special Rapporteur on the right to food,
- ²⁸ See World Bank (2007) *World development report 2008: Agriculture for development*, Washington: World Bank, and IAASTD (2008) *Agriculture at a crossroads*, International Assessment of Agricultural Knowledge, Science and Technology for Development.
- ²⁹ IPCC (2008) *Intergovernmental Panel on Climate Change Fourth Assessment Report*, Geneva: IPCC
- ³⁰ Niggli, U *et al* (2009) *Low Greenhouse gas agriculture, mitigation and adaptation potential of sustainable farming systems*, Rome: FAO, see: <ftp://ftp.fao.org/docrep/fao/010/ai781e/ai781e00.pdf>
- ³¹ Niggli, U *et al* (2009) *Low Greenhouse gas agriculture, mitigation and adaptation potential of sustainable farming systems*, Rome: FAO, see: <ftp://ftp.fao.org/docrep/fao/010/ai781e/ai781e00.pdf>
- ³² Eric Holt-Giménez, "Measuring Farmers' Agroecological Resistance After Hurricane Mitch in Nicaragua: A Case Study in Participatory, Sustainable Land Management Impact Monitoring," *Agriculture, Ecosystems and the Environment*, 93:1-2, 2002, pp. 87-105.
- ³³ C. Pye-Smith "A Rural Revival in Tanzania: How agroforestry is helping farmers to restore the woodlands in Shinyanga Region," *Trees for Change* No. 7, Nairobi, World Agroforestry Centre (ICRAF), 2010, p. 15.
- ³⁴ D.P. Garrity *et al.*, "Evergreen Agriculture: a robust approach to sustainable food security in Africa," *Food Security* 2:3, 2010, p. 200; K. Linyunga *et al.*, "Accelerating agroforestry adoption: A case of Mozambique," ICRAF Agroforestry Project, Paper presented at the IUFRO Congress, Rome, 12-15 July 2004.
- ³⁵ A.M. Diop, "Management of Organic Inputs to Increase Food Production in Senegal," in *Agroecological innovations. Increasing food production with participatory development*, N. Uphoff (ed.), London, Earthscan Publications, 2001, p. 252.
- ³⁶ F.K. Akinnifesi *et al.*, "Fertiliser trees for sustainable food security in the maize-based production systems of East and Southern Africa. A review," *Agronomy for Sustainable Development*, 30:3, 2010, pp. 615-629.
- ³⁷ UNCTAD/UNEP (2008) *Organic agriculture and food security in Africa*, New York: United Nations, see: http://www.unctad.org/en/docs/ditcted200715_en.pdf
- ³⁸ F. Eyhord *et al.*, "The viability of cotton-based organic agriculture systems in India," *International Journal of Agricultural Sustainability*, 5, 2007, pp. 25-38; S. Edwards, "The impact of compost use on crop yields in Tigray, Ethiopia," FAO International Conference on Organic Agriculture and Food Security, Rome, 2-4 May 2007.
- ³⁹ See: IAASTD (2008) *Agriculture at a crossroads*, International Assessment of Agricultural Knowledge, Science and Technology for Development, Washington DC: IAASTD; UNCTAD/UNEP (2008) *Organic agriculture and food security in Africa*, New York: United Nations, see: http://www.unctad.org/en/docs/ditcted200715_en.pdf; World Bank (2007)

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- World development report 2008: Agriculture for development*, Washington: World Bank; Niggli, U *et al* (2009) *LowGreenhouse gas agriculture, mitigation and adaptation potential of sustainable farming systems*, Rome: FAO, see: <ftp://ftp.fao.org/docrep/fao/010/ai781e/ai781e00.pdf>; High-Level task force on the global food security crisis (2008) Comprehensive framework for action, see: <http://www.un.org/issues/food/taskforce/Documentation/CFA%20Web.pdf>; UN Commission on Sustainable Development (2008) chairman's summary – Part 1. New York: United Nations; FAO (2008) *Declaration of the high-level conference on world food security: the challenges of climate change and bioenergy*, see: http://www.fao.org/fileadmin/user_upload/foodclimate/HLCdocs/declaration-E.pdf; De Schutter, O (2008) *Building resilience: a human rights framework for world food and nutrition security*, New York: United Nations; UNEP (2009) *The environmental food crisis*, Nairobi: UNEP
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- ⁴¹ Altieri M. (), *Ecological Impacts of Industrial Agriculture and the Possibilities for Truly Sustainable Farming*, available at http://nature.berkeley.edu/~christos/espm118/web_pages/article_pages/indust_ag_page1.html;
- ⁴² De Schutter O. (2011), *Agroecology and the Right to Food*, Report presented at the 16th Session of the United Nations Human Rights Council [A/HRC/16/49]
- ⁴³ IFAD (2011). *IFAD's Environment and Natural Resource Management Policy: Resilient livelihoods through the sustainable use of natural assets*. IFAD.
- ⁴⁴ Centre for Land, Economy and Rights of Women. *Mainstreaming gender in agricultural programmes within the context of NEPAD's strategy on agriculture and rural development*, Nairobi, 2006, p.vi. Cited in *Fertile Grounds: How governments and donors can halve hunger by supporting small farmers*. ActionAid International 2010.
- ⁴⁵ International Assessment of Agricultural Knowledge, Science and Technology for Development. (IAASTD). *Global Summary for Decision Makers*. IAASTD 2008. P. 5
- ⁴⁶ Beintema, N. and H. Elliott (2009). *Setting meaningful investment targets in agricultural research and development: Challenges, opportunities and fiscal realities*. Roma, FAO
- ⁴⁷ FAO (2010a) *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture – Synthetic Account*. Rome. <http://www.fao.org/agriculture/seed/sow2/> p.7
- ⁴⁸ A. Degrande, et al., *Mechanisms for scaling-up tree domestication: how grassroots organisations become agents of change*, ICRAF, 2006, p. 6; E. Holt-Giménez, *Campesino a campesino: voices from Latin America's farmer to farmer movement for sustainable agriculture*, Oakland, Food First Books, 2006; P. Rosset et al. *Revolución agroecológica: El Movimiento de Campesino a Campesino de la ANAP en Cuba*, Havana, La Via Campesina and ANAP, 2010.
- ⁴⁹ Experience with agroecological techniques is growing everyday within peasant networks such as La Via Campesina and the AgriCultures Network (former LEISA) globally; Réseau des Organisations Paysannes et des Producteurs Agricoles de l'Afrique de l'Ouest (ROPPA), Eastern & Southern Africa Farmers' Forum (ESAFF), and PELUM (Participatory Ecological Land Use Management) network in Africa, MASIPAG network in the Philippines (Magsasaka at Siyentista Tungo sa Pag-unlad ng Agrikultura), or Assessoria e Serviços a Projetos em Agricultura Alternativa (AS-PTA) and Movimento dos Trabalhadores Sem Terra (MST) in Brazil. Source E. Holt Gímenez, "Linking farmers' movements for advocacy and practice," *Journal of Peasant Studies*, 37:1, 2010, pp. 203-236.
- ⁵⁰ David M. Amudavi, et al., "Evaluation of farmers' field days as a dissemination tool for push-pull technology in Western Kenya," *Crop Protection*, 28, 2009, p. 226.
- ⁵¹ IFPRI. 2007. Thurlow J et al, 'Rural investments to accelerate growth and poverty reduction in Kenya', *IFPRI discussion paper 00723*, October 2007, pp22, 32.
- ⁵² ActionAid International. *Fertile Grounds: How governments and donors can halve hunger by supporting small farmers*. ActionAid International 2010. P. 26.
- ⁵³ ActionAid International. *Fertile Grounds: How governments and donors can halve hunger by supporting small farmers*. ActionAid International 2010. P. 24.
- ⁵⁴ Civil Society Agriculture Network (CISANET). *The people's voice: Agricultural sector pre-budget consultations report for 2009/10 financial year*, April 2009; CISANET, 2005/06 *Agriculture Expenditure Tracking*, 2007. Cited in *Fertile Grounds: How governments and donors can halve hunger by supporting small farmers*. ActionAid International 2010.. pp-30-31.
- ⁵⁵ International Assessment of Agricultural Knowledge, Science and Technology for Development. *Global report: Agriculture at a Crossroads*, April 2008 p2. Cited in *Fertile Grounds: How governments and donors can halve hunger by supporting small farmers*. ActionAid International 2010.
- ⁵⁶ IAASTD (2009), *Global Report – Agriculture at a Crossroad*