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## RESEARCH ARTICLE

### ROLE OF WORLD'S MAJOR AGRICULTURAL ORGANIZATIONS IN AGRICULTURAL DEVELOPMENT

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#### ABSTRACT

High-input, resource-intensive farming systems, which have caused massive deforestation, water scarcities, soil depletion and high levels of greenhouse gas emissions, cannot deliver sustainable food and agricultural production. The core challenge is to produce more with less, while preserving and enhancing the livelihoods of small-scale and family farmers, and ensuring access to food by the most vulnerable. For this, a twin-track approach is needed which combines investment in social protection, to immediately tackle undernourishment, and pro-poor investments in productive activities especially agriculture and in rural economies -to sustainably increase income-earning opportunities of the poor. The world will need to shift to more sustainable food systems which make more efficient use of land, water and other inputs and sharply reduce their use of fossil fuels, leading to a drastic cut of agricultural green-house gas emissions, greater conservation of biodiversity, and a reduction of waste. This will necessitate more investment in agriculture and agri-food systems, as well as greater spending on research and development, to promote innovation, support sustainable production increases, and find better ways to cope with issues like water scarcity and climate change. Along with boosting production and resilience, equally critical will be creating food supply chains that better connect farmers in low- and middle-income countries to urban markets — along with measures which ensure access for consumers to nutritious and safe food at affordable prices, such as pricing policies and social protection programs. In this background, the study's main objective was to know the role of several major global agricultural organizations in agricultural development.

## INTRODUCTION

Agriculture can help reduce poverty, raise incomes and improve food security for 80% of the world's poor, who live in rural areas and work mainly in farming. The World Bank Group is a leading financier of agriculture, with \$2.9 billion in new commitments in 2016. Agricultural development is one of the most powerful tools to end extreme poverty, boost shared prosperity and feed a projected 9.7 billion people by 2050. Growth in the agriculture sector is two to four times more effective in raising incomes among the poorest compared to other sectors. In 2016 analyses found that 65% of poor working adults made a living through agriculture. Agriculture is also crucial to economic growth. In 2014, it accounted for one-third of global gross-domestic product (GDP). But agriculture-driven growth, poverty reduction, and food security is at risk. Climate change could cut crop yields, especially in the world's most food-insecure regions.

Agriculture, forestry and land use change are responsible for 25% of greenhouse gas emissions. Mitigation in the agriculture sector is part of the solution to climate change. The current food system also threatens the health of people and the planet. Agriculture accounts for 70% of water use and generates unsustainable levels of pollution and waste. Risks associated with poor diets are also the leading cause of death worldwide. Approximately three billion people are either not eating enough or eating the wrong types of food, resulting in illnesses and health crises.

A 2016 report found that hunger is a challenge for 815 million people worldwide. In this background, the main purpose of this study was to find out the several roles played by various major international and national agricultural organizations in agricultural development, regionally as well as globally.

## Asian agricultural organizations

**International rice research institute (IRRI), Los Banos, Philippines:** The IRRI is an international agricultural research and training organization with headquarters in Los Baños, Laguna in the Philippines and offices in seventeen countries. IRRI is known for its work in developing rice varieties that contributed to the Green Revolution in the 1960s which preempted the famine in Asia. The Institute aims to reduce poverty and hunger, improve the health of rice farmers and consumers, and ensure environmental sustainability of rice farming. It advances its mission through collaborative research, partnerships, and the strengthening of the national agricultural research and extension systems of the countries IRRI works in. IRRI is one of 15 agricultural research centers in the world that form the CGIAR (Consortium of International Agricultural Research Centers), a global partnership of organizations engaged in research on food security. IRRI was established in 1960 with the support of the Ford Foundation, the Rockefeller Foundation, and the Government of the Philippines.

**Centre for international forestry research (CIFOR), bogor, Indonesia:** The CIFOR is a non-profit scientific research organization that conducts research on the use and management of forests with a focus on tropical forests in developing countries. CIFOR is the forestry research center of the CGIAR. CIFOR's research and expert analysis help policy makers and practitioners shape policy, improve the management of tropical forests and address the needs of people who depend on forests for their livelihoods. CIFOR has its headquarters in Bogor, Indonesia. CIFOR envisions a more equitable world where forestry and landscapes enhance the environment and well-being for all.

**International centre for agricultural research in the dry areas (ICARDA), aleppo, Syria:** The ICARDA is a global research-for-development organization. We envision thriving and resilient livelihoods in dryland communities of the developing world coming with robust incomes, secure access to food, markets, nutrition and health and the capacity to manage natural resources in equitable, sustainable and innovative ways. Since its establishment in 1977 as a non-for-profit organization, ICARDA has implemented research for development programs in more than 50 countries in the world's dry areas. Mission is to provide innovative science-based solutions for improving the resilience and livelihoods of the resource-poor in dry areas. Within the CGIAR consortium, ICARDA has a global mandate for the crop development of barley, lentil and faba bean and serves the non-tropical dry areas for the improvement of water-use efficiency in agriculture, rangeland issues and small-ruminant production. ICARDA has been temporarily headquartered in Beirut, Lebanon, since leaving Aleppo, Syria, in 2012. ICARDA research activities include the development of new crop varieties, water harvesting, conservation agriculture, the diversification of production systems, integrated crop/rangeland/livestock production systems, and the empowerment of rural women.

**International crops research institute for the semi-arid tropics (ICRISAT), patancheru, Andhra Pradesh:** The ICRISAT is a non-profit, non-political organization that conducts agricultural research for development in the dry lands of Asia and sub-Saharan Africa. Covering 6.5 million square

kilometers of land in 55 countries, the semi-arid or dry land tropics has over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger and a degraded environment through better agriculture. ICRISAT is headquartered in Hyderabad, Telangana State, in India, with two regional hubs (Nairobi, Kenya and Bamako, Mali) and country offices in Niger, Nigeria, Zimbabwe, Malawi, Ethiopia and Mozambique. ICRISAT conducts research on five highly nutritious drought-tolerant crops: chickpea, pigeonpea, pearl millet, sorghum and groundnut. Since its inception, host country India has granted a special status to ICRISAT as a UN Organization operating in the Indian territory making it eligible for special immunities and tax privileges.

**International water management institute (IWMI), battaramulla, Sri Lanka:** The IWMI is a non-profit, scientific research organization focusing on the sustainable use of water and land resources in developing countries. IWMI works in partnership with governments, civil society and the private sector to develop scalable agricultural water management solutions that have a real impact on poverty reduction, food security and ecosystem health. Headquartered in Colombo, Sri Lanka, with regional offices across Asia and Africa, IWMI is a CGIAR Research Center and leads the CGIAR Research Program on Water, Land and Ecosystems. IWMI's vision, as reflected in the Strategy 2014-2018, is 'a water-secure world'.

**World fish centre, penang, Malaysia:** World Fish is an international, non-profit research organization with headquarters in Penang, Malaysia, and offices in Asia, Africa, and the Pacific. World Fish's mission is to harness the potential of fisheries and aquaculture to reduce poverty and hunger in developing countries. World Fish is a member of the CGIAR. Working in partnership with private and public sectors and civil society, World Fish uses its scientific expertise in fisheries and aquaculture to promote sustainable, evidence-based development solutions and policy recommendations.

**Asia pacific association of agricultural research institute, Thailand (APAARI):** APAARI is a unique voluntary, membership-based, self-mandated, apolitical and multi-stakeholder partnership organization in the Asia-Pacific region. Since its establishment in 1990, it has significantly contributed towards addressing regional agricultural research needs. The close links, networks, partnerships and collaboration with stakeholders that APAARI has established over the years, as well as its goodwill, authority and focus on results, make the Association a valuable actor that continues to contribute to the development of agriculture and agri-food research and innovation systems in the region. The Indian Council of Agricultural Research is long term and active member of APAARI.

**Indian council of agricultural research (ICAR), India:** The ICAR is an autonomous body responsible for co-ordinating agricultural education and research in India. It reports to the Department of Agricultural Research and Education, Ministry of Agriculture. It is the largest network of agricultural research and education institutes in the world. Presently, regulation of agricultural education is the mandate of ICAR. Formerly known as Imperial Council of Agricultural Research, it was established on 16 July 1929 as a registered society. The ICAR

has its headquarters at New Delhi. The Council is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country.

**FAO regional office asia & the pacific, Bangkok:** The FAO Regional Office for Asia and the Far East was first temporarily opened in China in 1947. Through a decision of the FAO governing bodies, in 1948 the office moved to its present location in Bangkok which subsequently became its permanent site in 1953. One of five FAO regional offices across the world, Regional Office for Asia and the Pacific has grown more than fourfold since 1948 and now has 46 member countries. In order to fulfill the vision and mission, a highly participatory process was used to translate FAO's corporate strategic objectives into five Regional Strategic Priority Areas: (a) strengthening food and nutritional security (b) fostering agricultural production and rural development (c) enhancing equitable, productive and sustainable natural resource management and utilization (d) improving capacity to respond to food and agricultural threats and emergencies (e) coping with the impact of climate change on agriculture and food and nutritional security.

**Protection of plant varieties & farmers' right authority (PPVFRA), India:** In order to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants it has been considered necessary to recognize and protect the rights of the farmers in respect of their contribution made at any time in conserving, improving and making available plant genetic resources for the development of the new plant varieties. Moreover to accelerate agricultural development, it is necessary to protect plants breeders' rights to stimulate investment for research and development for the development of new plant varieties. To give effect to the aforesaid objectives the Protection of Plant Varieties and Farmers' Rights Act, 2001 has been enacted in India. For the purposes of this Act, Protection of Plant Varieties and Farmers' Rights Authority has been established and is located at New Delhi.

**Asia pacific rural and agricultural credit association (APRACA), Bangkok, Thailand:** APRACA was established in 1977 on the occasion of its First General Assembly held in New Delhi, India. Its main goal is to alleviate poverty in the Asia Pacific Region through rural and agricultural finance by facilitating cooperation as well as exchange of information and expertise among its members. Its headquarters is in Bangkok, Thailand. APRACA has earned a well deserved reputation as the premier organization for rural finance in the Asia-Pacific Region. The APRACA aims to promote the efficiency and effectiveness of rural finance, and access to sustainable financial services for small farmers in its member countries. Currently, APRACA has members in over 23 countries, and it acts to promote the exchange of information and expertise on rural finance between them.

#### **African agricultural organizations**

**Africa rice centre, cotonou, Benin:** The Africa Rice Center (Africa Rice), formerly known as the West Africa Rice Development Association (WARDA), is an African organization currently headquartered in Cotonou, Benin. AfricaRice is an agricultural research center that was

constituted in 1971 by 11 West African countries. Presently the center counts 25 African member states. Since 1986, AfricaRice has been one of the 15 specialized research centers of the CGIAR. Africa Rice aims to contribute to poverty alleviation and food security in Africa through research for development. The center has therefore close links to agricultural research organizations in the African member states, to agricultural universities and research institutes in Europe, Japan and the United States, and to the development sector, which include Non Governmental Organizations, farmers organizations and donors.

**International institute of tropical agriculture (IITA), ibadan, Nigeria:** The IITA works with partners to enhance crop quality and productivity, reduce producer and consumer risks, and generate wealth from agriculture, with the ultimate goals of reducing hunger, malnutrition, and poverty. IITA's research-for-development focuses on addressing the development needs of tropical countries. The institute was established in 1967 and is headquartered in Ibadan, Nigeria, with several research stations across Africa. IITA is a nonprofit organization. IITA was established with the idea of the institute came from Ford and Rockefeller foundations desire to establish a centre for the improvement in quality of tropical foods. The institute focused on a cereal improvement program, grain and legumes improvement program, farming systems and root and tuber improvement program. IITA joined CGIAR in 1971. It focuses on smallholder cropping and postharvest systems and on the following food crops: cassava, cowpea, maize, banana, soybean and yam.

**International livestock research institute (ILRI), Nairobi, Kenya/Addis Ababa, Ethiopia:** The ILRI works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a CGIAR research centre – part of a global research partnership for a food-secure future. Co-hosted by Kenya and Ethiopia. The ILRI is an international agricultural research institute based in Nairobi, Kenya, and founded in 1994 by the merging of the International Livestock Centre for Africa and the International Laboratory for Research on Animal Diseases. ILRI has its headquarters in Nairobi, Kenya, a principal campus in Addis Ababa, Ethiopia, and offices in other countries of Africa and Asia.

**World agro-forestry centre (ICRAF), Nairobi, Kenya:** The ICRAF is a centre of scientific excellence that harnesses the benefits of trees for people and the environment. Leveraging the world's largest repository of agroforestry science and information, we develop knowledge practices, from farmers' fields to the global sphere, to ensure food security and environmental sustainability. Our **Mission:** To harness the multiple benefits trees provide for agriculture, livelihoods, resilience and the future of our planet, from farmers' fields through to continental scales. The World Agroforestry Centre (a brand name used by the International Centre for Research in Agroforestry, ICRAF), is an international institute headquartered in Nairobi, Kenya, and founded in 1978. It is a member of CGIAR.

**Support to farmers' organizations in Africa programme (SFOAP):** The SFOAP was a pilot programme launched in 2009 to strengthen the capacity of FOs in African countries and their regional and pan-African networks. It was the first continental programme in Africa to be initiated by the four

regional networks of FOs in sub-Saharan Africa to work together with a single programme in support of the institutional development of their organizations at all levels. The programme aims to further strengthen and consolidate the institutional capacities of FOs and give them a greater say in agricultural policies and programmes. In addition, the main phase supports the development of FOs' economic services to facilitate the integration of smallholder farmers in value chains.

**Geographic location:** Algeria, Egypt, Morocco, Tunisia

**Alliance for a green revolution in Africa (AGRA):** The AGRA is an organization dealing with agricultural products in Africa. It is funded by the Bill and Melinda Gates Foundation as well as the Rockefeller Foundation. Broadly, it deals with improving agricultural products and supporting local farm owners and labor. AGRA's stated goals (for 2020) are: (a) doubling the income of 20 million small farmers (b) reducing food insecurity 50% in 20 countries (c) ensuring that at least 15 countries are on a path toward sustainable and climate-friendly green agriculture. The AGRA was founded in 2006 on the belief that investing in agriculture is the surest path to reducing poverty and hunger in Africa. The AGRA was based on a shared vision that Africa has the ability to feed itself and benefit from a "green revolution" that has increased crop production and led to surpluses in Latin America and Asia.

**African agricultural technology foundation (AATF), Nairobi, Kenya:** The AATF is a not-for-profit organisation that facilitates and promotes public/private partnerships for the access and delivery of appropriate agricultural technologies for sustainable use by smallholder farmers in Sub Saharan Africa through innovative partnerships and effective stewardship along the entire value chain. The Foundation is a one-stop-shop that provides expertise and know-how that facilitates the identification, access, development, delivery and utilisation of agricultural technologies. It also contributes to capacity building in Africa by engaging African institutions in the execution of tasks that contribute to the Foundation's mission.

**Institute of environmental and agricultural research, (INERA), Burkina Faso:** The INERA conducts applied and specifically targeted research linked to multifunctional agriculture and rural development, plant sciences, environmental protection and natural resource management. Objective is to provide industries, governments and consumers with new knowledge, services and solutions within these scientific fields.

**Kenya national agricultural research institute (KARI):** The KARI was established under the Ministry of Research, Technical Training and Technology has its headquarters in Nairobi and has several National Agricultural Research Centres (NARCs) and Regional Research Centres (RRCs) located in various parts of the country. NARCs address research problems of commodities or factors of production, while the RRCs focus on identification and diagnosis of production problems in various agro-ecological zones and adapt technologies for increased production at the farm level

**Agricultural research council (ARC), South Africa:** The ARC was established in 1990 and is the principal agricultural research institution in South Africa. The Agricultural Research Act sets out the objectives of the ARC as "conducting of

research, development and technology transfer in order to: -(a) promote agriculture and industry; (b) contribute to a better quality of life; (c) facilitate natural resource conservation; and (d) alleviate poverty. Vision -"Excellence in agricultural research and development"

**South African national biodiversity institute (SANBI):** The SANBI was established on 1 September 2004. The mandate of SANBI is to play a leading role in South Africa's national commitment to biodiversity management, now and into the future. In partnership with the Department of Environmental Affairs and the biodiversity sector, SANBI is tasked with leading the biodiversity research agenda. SANBI contributes to the key government priority on the eradication of poverty through the creation of decent and sustainable employment opportunities by implementing a number of collaborative programmes that focus on the rehabilitation of ecosystems. SANBI's mission is to ensure biodiversity richness is conserved for all South Africans.

**Uganda forestry resources and institutions Centre:** The International Forestry Resources and Institutions (IFRI) research network examines how governance arrangements affect forests and the people who depend on them. Our goal is to carry out rigorous research that can help policy makers and forest users design and implement improved evidence-based forest policies. The IFRI network is comprised of 14 Collaborating Research Centers (CRCs) located around the globe. Our researchers use a common data collection method to ensure that sites can be compared across space and time. Our unique database contains information about biodiversity, livelihoods, institutions, and forest carbon for over 250 sites in 15 countries between 1992 and the present.

#### European agricultural organizations

**International institute of agriculture (IIA), Rome, Italy:** International Institute of Agriculture, a world organization, with headquarters in Rome, Italy, founded in 1905, and having for object the collection and dissemination of knowledge relating to agriculture in the various countries represented in the institute. The IIA published the first world agricultural census. After World War II, both its assets and mandate were handed over to the Food and Agriculture Organization (FAO) of the United Nations.

**Food and agriculture organization (FAO); Rome, Italy:** In 1943, the United States President Franklin D. Roosevelt called a United Nations Conference on Food and Agriculture. Representatives from forty-four governments gathered at The Homestead Resort in Hot Springs, Virginia, U.S., from 18 May to 3 June. They committed themselves to founding a permanent organization for food and agriculture, which happened in Quebec City, Canada, on 16 October 1945 with the conclusion of the Constitution of the Food and Agriculture Organization. FAO headquarters are in Rome. In 1951, FAO's headquarters were moved from Washington, D.C., United States, to Rome, Italy. The Food and Agriculture Organization (FAO) is specialized agency of the United Nations that leads international efforts to defeat hunger. Our goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With over 194 member states, FAO works in over 130 countries worldwide.

Table 1. Asian Agricultural organizations

Sl.	Agricultural organizations	Abbreviation	Headquarters Location	Country	Year of Initiation
1.	International Rice Research Institute	IRRI	Los Baños, Laguna	Philippines	1960
2.	Center for International Forestry Research	CIFOR	Bogor	Indonesia	1996
3.	International Center for Agricultural Research in the Dry Areas	ICARDA	Aleppo	Syria	1977
4.	International Crops Research Institute for the Semi-Arid Tropics	ICRISAT	Patancheru, Hyderabad	India	1972
5.	International Water Management Institute	IWMI	Battaramulla, Colombo	Sri Lanka	1985
6.	World Fish Centre	WFC/WF	Penang	Malaysia	1975
7.	Asia Pacific Association of Agricultural Research Institute	APAARI	Bangkok	Thailand	1990
8.	Indian Council of Agricultural Research	ICAR	New Delhi	India	1929
9.	FAO Regional Office for Asia and the Pacific	FAO-ROAP	Bangkok	Thailand	1953
10.	Protection of Plant Varieties & Farmers' Right Authority	PPVFRA	New Delhi	India	2001
11.	Asia Pacific Rural and Agricultural Credit Association	APRACA	Bangkok	Thailand	1977

Table 2. African agricultural organizations

Sl.	Agricultural organizations	Abbr	Headquarters Location	Country	Year of Initiation
1.	African Rice Centre	ARC/AR	Cotonou	Benin	1971
2.	International Institute of Tropical Agriculture	IITA	Ibadan	Nigeria	1967
3.	International Livestock Research Institute	ILRI	Nairobi, Addis Ababa,	Kenya, Ethiopia	1994
4.	World Agro-Forestry Centre	ICRAF	Nairobi	Kenya	1978
5.	Support to Farmers' Organizations in Africa Programme	SFOAP	Various places	Algeria, Egypt, Morocco, Tunisia	2009
6.	Alliance for a Green Revolution in Africa	AGRA	Various places of 16 countries	Specially Ghana, Mali, Mozambique and Tanzania	2006
7.	African Agricultural Technology Foundation	AATF	Nairobi	Kenya	2002
8.	Institute of Environmental and Agricultural Research	INERA	Quagadougou	Burkina Faso	2001
9.	Kenya National Agricultural Research Institute	KARI	Nairobi	Kenya	2009
10.	Agricultural Research Council	ARC	Pretoria	South Africa	1990
11.	South Africa National Biodiversity Institute	SANBI	Pretoria	South Africa	2004
12.	Uganda Forestry Resources and Institutions Centre	UFRIC	Kampala	Uganda	1987

(Abbr. =Abbreviation)

Table 3. European agricultural organizations

Sl.	Agricultural organizations	Abbreviation	Headquarters Location	Country	Year of Initiation
1.	International Institute of Agriculture	IIA	Rome	Italy	1905
2.	Food and Agriculture Organization	FAO	Rome	Italy	1945
3.	Biodiversity International	BI	Rome	Italy	1974
4.	International Board for Plant Genetic Resources	IBPGR	Rome	Italy	1974
5.	Consultative Group on International Agricultural Research	CGIAR	Montpellier	France	1971
6.	International Seed Testing Association	ISTA	Bassersdorf	Switzerland	1924
7.	European Conservation Agriculture Federation	ECAF	Brussels	Belgium	1999
8.	European Crop Protection Association	ECPA	Brussels	Belgium	2001
9.	International Fund for Agricultural Development	IFAD	Rome	Italy	1977
10.	Association of International Research and Development Centers for Agriculture	AIRCA	Rome	Italy	2012
11.	European Commission on Agriculture	ECA	Budapest	Hungary	1949
12.	Global Forum on Agricultural Research	GFAR	Rome	Italy	1996
13.	World Intellectual Property Organization	WIPO	Geneva	Switzerland	1967
14.	World Meteorological organization	WMO	Geneva	Switzerland	1950
15.	World Food Programme	WFP	Rome	Italy	1961
16.	United Nations Institute for Training and Research	UNITAR	Geneva	Switzerland	1963
17.	World Trade Organization	WTO	Geneva	Switzerland	1995
18.	Globally Important Agricultural Heritage System	GIAHS	Rome	Italy	2002

**Biodiversity international (BI), maccaresse, rome, Italy:** The BI is a global research-for-development organization with a vision – that agricultural biodiversity nourishes people and sustains the planet. The organization delivers scientific evidence, management practices and policy options to use and safeguard agricultural biodiversity to attain global food and nutrition security, working with partners in low-income countries in different regions where agricultural biodiversity can contribute to improved nutrition, resilience, productivity and climate change adaptation.

Biodiversity International is a member of the CGIAR. Its headquarters are in Maccaresse, outside Rome, Italy.

**International board for plant genetic resources (IBPGR), Rome, Italy:** The IBPGR is an international scientific-organization under the aegis of the CGIAR and established by them in 1974. The basic function of IBPGR is to advance the conservation and use of plant genetic resources for the benefit of present and future generations. In many countries, IBPGR has encouraged the establishment of genetic resources

**Table 4. North American agricultural organizations**

Sl.	Agricultural organizations	Abbr.	Headquarters Location	Country	Year of Initiation
1.	International Maize and Wheat Improvement Centre	CIMMYT	Mexico City	Mexico	1966
2.	International Food Policy Research Institute	IFPRI	Washington D.C.	USA	1975
3.	International Food and Agricultural Trade Policy Council	IFATPC	Washington D.C.	USA	1987
4.	North American Plant Protection Organization	NAPPO	Raleigh, North Carolina	USA	1976
5.	United States Department of Agriculture	USDA	Washington D.C.	USA	1862
6.	International Association for the Plant Protection Sciences	IAPPS	Nebraska	USA	1946
7.	American Crop Protection Association	ACPA	Washington D.C.	USA	2001
8.	American Association for Agricultural Education	AAAE	Texas	USA	1991
9.	Association for International Agricultural and Extension Education	AIAEE	Texas	USA	1984
10.	International Association of Agricultural Information Specialists	IAALD	Kentucky	USA	1955
11.	National Institute of Food and Agriculture	NIFA	Washington D.C.	USA	2009
12.	North American Agricultural Marketing Officials	NAAMO	Manhattam	USA	2006
13.	One Acre Fund	OAF	Washington D.C.	USA	2009

(Abbr. =Abbreviation)

**Table 5. South American agricultural organizations**

Sl.	Agricultural organizations	Abbreviation	Headquarters Location	Country	Year of Initiation
1.	International Center for Tropical Agriculture	CIAT	Cali,	Columbia	1967
2.	International Potato Center	CIP	Lima	Peru	1971
3.	Brazilian Agricultural Research Corporation	EMBRAPA	Brasília	Brazil	1973

**Table 6. Oceanian agricultural organizations**

Sl.	Agricultural organizations	Abbreviation	Headquarters Location	Country	Year of Initiation
1.	New Zealand Plant Breeding and Research Association	NZPBRA	Templeton, Christchurch	New Zealand	1991
2.	Institute for Research, Extension and Training in Agriculture	IRETA	Alafua	Samoa	1982
3.	Asia Oceania Agricultural Proteomics Organization	AOAPO	Tsukuba	Japan	2010
4.	Australian Bureau of Agricultural and Resource Economics and Sciences	ABARES	Canberra	Australia	1945

programmes where none previously existed. The headquarters are in Rome, Italy. The basic mandate of the IBPGR is to further the study, collection, preservation, evaluation and utilization of the genetic diversity of useful plants for the benefit of mankind by the development of a world network of genetic resources activities.

**Consultative group on international agricultural research (CGIAR), Montpellier, France:** Formation-1971; Purpose: To reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership. Headquarters: Montpellier, France. CGIAR-Consortium of International Agricultural Research Centers (formerly the Consultative Group for International Agricultural Research) is a global partnership that unites organizations engaged in research for a food-secured future. CGIAR research is dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring sustainable management of natural resources. It is carried out by 15 centers that are members of the CGIAR Consortium, in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations, and the private sector. The CGIAR's mission is to achieve sustainable food security and reduce poverty in developing countries through scientific research and research-related activities in the fields of agriculture, forestry, fisheries, policy, and environment. CGIAR's main areas of focus are: sustainable land management and production; enhancing National

Agricultural Research Systems; germplasm improvement and collection; and policy.

**International seed testing association (ISTA):** Founded in 1924, with the aim to develop and publish standard procedures in the field of seed testing, ISTA is inextricably linked with the history of seed testing. Vision-Uniformity in seed quality evaluation worldwide. Mission-ISTA members work together to achieve their vision of 'Uniformity in seed quality evaluation worldwide'. Our Association produces internationally agreed rules for seed sampling and testing, accredits laboratories, promotes research, provides international seed analysis certificates and training, and disseminates knowledge in seed science and technology.

**European conservation agriculture federation (ECAAF):** The ECAAF was constituted in Brussels on 14 January 1999, as a non-profit association. It was conceived to encourage any issue focused on the conservation of agrarian soil and its biodiversity in the context of a sustainable agriculture. The aims of ECAAF are (i) to provide and disseminate information among farmers, agricultural technicians and advisors as well as society in general; (ii) to promote research, development and dissemination of any aspects related to the principles conservation agriculture and (iii) to develop all kinds of activities and programs addressed to the achievement of the previous aims. The role of ECAAF in this project is mainly to provide its long-lasting expertise as European stakeholder where sustainable agriculture in general, and the promotion of the principles of conservation agriculture, in specific, is concerned.

**European crop protection association (ECPA):** The ECPA is a member of global G.A.P. G.A.P. stands for Good Agricultural Practice and GLOBAL G.A.P. is the worldwide standard that assures it. GLOBAL G.A.P. is an organisation with a crucial objective: safe, sustainable agriculture worldwide; it sets voluntary standards for the certification of agricultural products around the globe, and more and more producers, suppliers and buyers are harmonising their certification standards to match. We represent the crop protection industry in Europe; innovative and science-based, our solutions keep crops healthy and contribute to providing Europeans with a safe, affordable, healthy, and sustainable food supply. We promote modern farming practices and campaign the use of crop protection technology important for the sustainable intensification of agriculture.

**International fund for agricultural development (IFAD), rome, Italy:** The IFAD is an international financial institution and a specialised agency of the United Nations dedicated to eradicating poverty and hunger in rural areas of developing countries. It was established as an international financial institution in 1977 at Rome, Italy. IFAD's goal is to empower poor rural men and women in developing countries to achieve higher incomes and improved living. IFAD has been working in India for more than 30 years. We work at the grassroots level, targeting the poorest marginalized farmers, women, youth, landless people, tribal communities and scheduled castes. IFAD is currently active in 98 countries with 210 measures, reaching about 100 million people. IFAD's mandate is to provide funding and other resources for programs that help poor farmers and pastoralists as well as landless and indigenous peoples in rural areas.

**Association of international research and development centers for agriculture (AIRCA), Rome, Italy:** AIRCA was launched on 2 March 2012 at the headquarters of the Food and Agriculture Organization (FAO) in Rome, Italy. Purpose is international coordination of agricultural research and development. The AIRCA is an international, non-profit alliance focused on increasing food security by supporting smallholder agriculture and rural enterprise within healthy, sustainable and climate-smart landscapes. AIRCA unites nine international agricultural research and development centers which focus on a diverse mix of commodities, crops and issues including tropical agriculture, vegetable production, bamboo and rattan, insect pests, fertilizer use, underutilized crops, biosaline agriculture and sustainable development in mountains. The broad alliance has collective access to a wide variety of crops and ecosystems.

**European commission on agriculture, (ECA) Budapest, Hungary:** Purpose: (1)To assist the region's Member Governments in cooperating on agricultural problems including research, education, extension, nutrition, and agricultural economy issues not under the purview of the Committee on Commodity Problems (2) to encourage and facilitate cooperation between international governmental and non-governmental organizations concerned with agriculture, and to make recommendations on all matters within its geographical and technical competence.

**Global forum on agricultural research, (GFAR) Rome, Italy:** Purpose is agricultural research and innovation and headquarters are at Rome, Italy. The Global Forum on Agricultural Research and Innovation (GFAR) is an inclusive

global mechanism enabling all those concerned with the future of agriculture and its role in development around the world to come together and address key global needs. GFAR provides an open forum for stakeholders across the agricultural spectrum—from researchers and organizations to farmers—to participate in collaborative discussion and action around the current and future state of agriculture. Established in 1996. GFAR's goal is to ensure that agricultural innovation systems, encompassing research, extension, education and enterprise - deliver the best development outcomes to resource-poor farmers and rural communities. Vision: The Global Forum makes agri-food research and innovation systems more effective, responsive and equitable, towards achieving Sustainable Development Goals.

**World intellectual property organization (WIPO), geneva, switzerland:** WIPO is the global forum for intellectual property services, policy, information and cooperation. We are a self-funding agency of the United Nations. Our mission is to lead the development of a balanced and effective international intellectual property (IP) system that enables innovation and creativity for the benefit of all. The WIPO is one of the 15 specialized agencies of the United Nations (UN). WIPO was created in 1967 "to encourage creative activity, to promote the protection of intellectual property throughout the world". WIPO currently has 191 member states, administers 26 international treaties, and is headquartered in Geneva, Switzerland. The World Intellectual Property Organization (WIPO) is dedicated to helping to ensure that the rights of creators and owners of intellectual property (IP) are protected worldwide and that inventors and authors are, thus, recognized and rewarded for their ingenuity.

**World meteorological organization (WMO), geneva, Switzerland:** The WMO is an intergovernmental organization with a membership of 191 Member States and Territories. It originated from the International Meteorological Organization (IMO), which was founded in 1873. It is the UN system's authoritative voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources. WMO became the specialized agency of the United Nations in 1951 for meteorology, operational hydrology and related geophysical sciences. Global data are needed to understand the behaviour of the Earth's atmosphere and its interaction with the land and oceans - whether it be to predict next week's weather or next year's climate, forecasters must have timely, quality-assured, standardized information coming from all corners of the world.

**World food programme (WFP), Rome, Italy:** The WFP is the food-assistance branch of the United Nations and the world's largest humanitarian organization addressing hunger and promoting food security. According to the WFP, it provides food assistance to an average of 80 million people in 76 countries each year. From its headquarters in Rome and from more than 80 country offices around the world, the WFP works to help people who cannot produce or obtain enough food for themselves and their families. It is a member of the United Nations Development Group and part of its Executive Committee. WFP was first established in 1961 after the 1960 Food and Agricultural Organization (FAO) Conference. The WFP was formally established in 1963 by the FAO and the United Nations General Assembly on a three-year experimental basis.

In 1965, the programme was extended to a continuing basis. Its vision is a "world in which every man, woman and child has access at all times to the food needed for an active and healthy life."

**United nations institute for training and research (UNITAR):** The UNITAR was established in 1963 following a UN General Assembly resolution "for the purpose of enhancing the effectiveness of the United Nations in achieving the major objectives of the Organization through extensive training and research". The institute's training targets two key sets of stakeholders, mainly from developing countries: the delegates to the UN and others who develop intergovernmental agreements establishing global norms, policies, and programmes, and the key national change agents who turn the global agreements into action. Serving more than 36,000 beneficiaries per year, UNITAR conducts close to 500 training and research activities around the world.

**World trade organization (WTO):** The WTO is the only global international organization dealing with the rules of trade between nations. The goal is to help producers of goods and services, exporters, and importers conduct their business. Headquarters: Geneva, Switzerland; The World Trade Organization (WTO) is an intergovernmental organization that regulates international trade. The WTO officially commenced on 1 January 1995 under the Marrakesh Agreement, signed by 123 nations on 15 April 1994, replacing the General Agreement on Tariffs and Trade (GATT), which commenced in 1948. It is the largest international economic organization in the world. The WTO deals with regulation of trade in goods, services and intellectual property between participating countries by providing a framework for negotiating trade agreements and a dispute resolution process aimed at enforcing participants' adherence to WTO agreements, which are signed by representatives of member governments and ratified by their parliaments. Among the various functions of the WTO, these are regarded by analysts as the most important: (a) It oversees the implementation, administration and operation of the covered agreements. (b) It provides a forum for negotiations and for settling disputes. The WTO has 164 members and 23 observer governments. As of 2007, WTO member states represented 96.4% of global trade and 96.7% of global GDP.

**Globally important agricultural heritage systems (GIAHS):** Purpose of GIAHS is to create public awareness, safeguard world agricultural heritage sites. It was started in 2002 by FAO (Food and Agricultural Organization). Aims at helping world population get ensured food security, eliminate hunger, poverty. The overall goal of the GIAHS Programme is to identify and safeguard Globally Important Agricultural Heritage Systems and their associated landscapes, agricultural biodiversity and knowledge systems through catalyzing and establishing a long-term programme to support such systems and enhance global, national and local benefits derived through their dynamic conservation, sustainable management and enhanced viability.

#### North American agricultural organizations

**International Maize and wheat improvement centre (CIMMYT), Mexico City, Mexico:** The CIMMYT (known by its Spanish acronym CIMMYT for *Centro Internacional de Mejoramiento de Maíz y Trigo*) is a non-profit research and

training institution dedicated to both the development of improved varieties of wheat and maize with the aim of contributing to food security, and the introduction of improved agricultural practices to smallholder farmers to help boost production, prevent crop disease and improve their livelihoods. Headquarters of CIMMYT is in Mexico City, Mexico. The first steps toward the creation of CIMMYT were taken in 1943 when cooperative efforts of the Mexican government and the Rockefeller Foundation led to the founding of the Office of Special Studies, an organization within the Mexican Secretariat of Agriculture, now known as the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food. The goal of the office was to ensure food security in Mexico and abroad through selective plant breeding and crop improvement. The project developed into a collaboration between Mexican and international researchers. It established global networks to test experimental crop varieties. As international demand grew and it became apparent CIMMYT required internal organization and increased funding, the center was reorganized and established as a non-profit scientific and educational institution in its own right in 1966. CIMMYT became one of the first international research centers to be supported through the CGIAR.

**International food policy research institute (IFPRI), Washington D.C.; USA:** IFPRI is an equal opportunity employer that provides researchers and professionals a collaborative environment to reduce hunger, poverty, and malnutrition worldwide through evidence-based research. The institution has been repeatedly recognized for the quality of the work produced and work environment. The IFPRI provides research-based policy solutions to sustainably reduce poverty and end hunger and malnutrition in developing countries. Established in 1975. It is a research center of CGIAR. IFPRI's vision is a world free of hunger and malnutrition. **Location:** Washington, D.C., USA.

**International food and agricultural trade policy council (IFATPC), Washington D.C.; USA:** The IFATPC was founded in 1987 as an independent group of leaders in food and agriculture from industrialized and developing countries. The IFATPC promotes a more open and equitable global food system by pursuing pragmatic trade and development policies in food and agriculture to meet the world's growing needs. Purpose: to support an event hosting climate change, agriculture and trade experts to recommend policy options to promote climate change mitigation without omitting the need to strengthen food security and contribute to economic development.

**North American plant protection organization (NAPPO), H,Q, Raleigh, NC:** The NAPPO, is the phytosanitary standard setting organization recognized by the North American Free Trade Agreement (NAFTA). It was created in 1976 as a regional organization of the International Plant Protection Convention (IPPC) of the FAO of the United Nations. The main activity under this mandate is to cooperate with the IPPC Secretary in achieving the objectives of the Convention and, where appropriate, cooperating with the Secretary and the Commission in developing international standards. The goal of the IPPC is to protect the world's cultivated and natural plant resources from the spread and introduction of plant pests while minimizing interference with the international movement of goods and people.

The NAPPO Secretariat is located in Raleigh, North Carolina, United States of America.

**United states department of agriculture (USDA):** The USDA, also known as the Agriculture Department, is the U.S. federal executive department responsible for developing and executing federal laws related to farming, forestry, and food. It aims to meet the needs of farmers and ranchers, promote agricultural trade and production, work to assure food safety, protect natural resources, foster rural communities and end hunger in the United States and internationally. Overview: Many of the programs concerned with the distribution of food and nutrition to people of America and providing nourishment as well as nutrition education to those in need are run and operated under the USDA Food and Nutrition Service. Activities in this program include the Supplemental Nutrition Assistance Program, which provides healthy food to over 40 million low-income and homeless people each month. USDA is a member of the United States Interagency Council on Homelessness, where it is committed to working with other agencies to ensure these mainstream benefits are accessed by those experiencing homelessness. President Abraham Lincoln founded the USDA in 1862, at a time when about 50% of Americans lived on farms.

**The international association for the plant protection sciences (IAPPS), nebraska, USA:** The IAPPS has the goal of gathering the results of plant protection research worldwide and making them globally available to science and practice. To this end the organisation periodically publishes the *Plant Protection Magazine* and every four years organises an international congress. The IAPPS was founded in 1946. Plant protection scientists and agricultural research societies from all over the world are represented in the governing body. The IAPPS organisation now has 15 regional offices.

**American crop protection association (ACPA):** The ACPA, a Web Site produced by ACPA, a professional association, is part of the Library of Congress September 11 Web Archive and preserves the web expressions of individuals, groups, the press and institutions in the United States and from around the world in the aftermath of the attacks in the United States on September 11, 2001. The ACPA, which represents pesticide manufacturers, will become CropLife America, reflecting the broadening scope of the plant science industry's focus and activities. "This is more than just a name change. It's change in the way we think about our industry and its positive contributions to society,"

**American association for agricultural education (AAAE):** The AAAE is a U.S. non-profit organization dedicated to studying, applying, and promoting the teaching and learning processes in agriculture. AAAE serves as an advocate for improvement of teaching and learning in agriculture. The organization provides for recruiting, inducting, and mentoring people into the profession of agricultural education.

**Association for international agricultural and extension education (AIAEE):** The AIAEE established in 1984, is a professional organization for agricultural and extension educators who share a common goal of strengthening agricultural and extension education programs and institutions worldwide. In today's complex and interdependent world, agricultural development must be seen in the broader context of holistic development.

The AIAEE is a professional association to network agricultural and Extension educators who share the common goal of strengthening agricultural and Extension education programs and institutions worldwide.

**International association of agricultural information specialists (IAALD):** The IAALD is the international professional association of people and institutions who are professionally involved in creating, capturing, accessing, or disseminating information and knowledge concerning agriculture and rural development. IAALD acts as a community of practice, linking and connecting information professionals worldwide. It convenes conferences and meetings, publishes a peer-reviewed journal, sponsors professional training and education, facilitates e-discussions, and publishes a web site, blog, etc. It works through a network of country and regional chapters; cooperating with independent 'sister' regional and specialist associations. IAALD was established in 1955 as the International Association of Agricultural Librarians and Documentalists - hence the acronym. Our **vision** is to be the leading global community of practice for information specialists serving agriculture.

**National institute of food and agriculture (NIFA), Washington, D.C, USA:** The NIFA programs are the mechanism by which we pursue our mission to invest in and advance agricultural research, education, and extension to solve societal challenges. Some programs administer funding and offer leadership while others focus on national leadership and collaboration. Headquarters are in Washington, D.C. The NIFA is a U.S. Federal government body whose creation was mandated in the Food, Conservation, and Energy Act of 2008. Its purpose is to consolidate all federally funded agricultural research, and is subordinate to the Department of Agriculture. It replaced the Cooperative State Research, Education, and Extension Service in 2009. The mission of the NIFA, an agency of the U.S. Department of Agriculture (USDA), is to stimulate and fund the research and technological innovations that will enhance American agriculture and make it more productive and environmentally sustainable while ensuring the economic viability of agriculture and production. NIFA is one of four USDA agencies that make up its Research, Education, and Economics (REE) mission area. NIFA's current priority areas include (1) global food security and hunger, (2) climate change, (3) sustainable energy, (4) childhood obesity, and (5) food safety.

**North american agricultural marketing officials (NAAMO), Manhattan, USA.** The NAAMO is an international organization of the State and Provincial government agricultural marketing officials who provide both domestic and international marketing services to the agricultural and food industries in their states and provinces. Each member state or province reflects its own diversity, but all members share common interests of market development, market information and communication and in market organization and cooperation. The purpose of NAAMO is to provide its' members with a forum to network, collaborate, and share insights to enhance the development, marketing and promotion of North American food and agricultural products.

**One acre fund (OAF), Washington D.C.; USA:** One Acre Fund is looking for an exceptional young professional to join our Business Development team as the organization continues an exciting period of fast growth and high impact.

One Acre Fund aspires to be the world's largest and most impactful non-profit organization. To a large extent, the future growth of One Acre Fund in the next ten years will hinge on our ability to mobilize resources and put them in service to rural farmers. One Acre Fund runs a robust R&D program, spanning over half a dozen countries and including trials with tens of thousands of farmers every year. As a data-driven organization, our R&D program is the beating heart of many of the strategic decisions; these decisions directly affect the wellbeing of hundreds of thousands of smallholder farmers every year. Tony Kalm was the inaugural leader of One Acre Fund in the U.S. from late 2009, and is now its President.

### South American agricultural organizations

**International center for tropical agriculture,(CIAT), Cali, Columbia:** The CIAT was formally established in 1967 and began its research in 1969. The formation of CIAT was backed by the Colombian government and Rockefeller, Ford, and Kellogg Foundations. While aware of the many constraints to farming in the tropics, CIAT's founders saw this vast region as a world of promise, where agriculture, with the aid of modern science, might contribute substantially to reducing hunger and poverty. Since no single organization can address the whole of tropical agriculture, CIAT complements the efforts of others by focusing on selected crops and research areas. CIAT develops technologies, methods, and knowledge that better enable farmers, mainly smallholders, to enhance eco-efficiency in agriculture. This means we make production more competitive and profitable as well as sustainable and resilient through economically and ecologically sound use of natural resources and purchased inputs. The CIAT is a not-for-profit research and development organization dedicated to reducing poverty and hunger while protecting natural resources in developing countries. It is based in Cali, Colombia. CIAT is one of the 15 specialized research centers of the CGIAR.

**International potato centre (CIP), Lima, Peru:** CIP is one of the 15 specialised research centres of the CGIAR and joined in 1972. CIP is truly a global center, with headquarters in Lima, Peru and offices in 18 countries across Asia, Africa, and Latin America. The International Potato Center (CIP) is a research facility based in Lima, Peru, that seeks to reduce poverty and achieve food security on a sustained basis in developing countries through scientific research and related activities on potato, sweet potato, other root and tuber crops, and on the improved management of natural resources in the Andes and other mountain areas. It was established in 1971 by decree of the Peruvian government. CIP furthers its mission through rigorous research, innovation in science and technology, and capacity strengthening among farmers and partners.

**Brazilian agricultural research corporation (EMBRAPA), Brazil:** Headquarters: Brasília, Brazil. The EMBRAPA is a state-owned research corporation affiliated with the Brazilian Ministry of Agriculture. Since its inception on April 26, 1973, it has been devoted to developing technologies, knowledge and technical-scientific information aimed at Brazilian agriculture, including livestock. Their mission is to "develop research, development and innovation solutions for the sustainability of agriculture, for the benefit of Brazilian society". EMBRAPA's organizational structure is composed of 46 centers that can be divided into Research Units or Service Units, and of 17 Central Units that comprise the corporation's headquarters. Such

research centers are distributed throughout the country in nearly all Brazilian states

### Oceanian agricultural organizations

**New Zealand plant breeding and research association (NZPBRA):** Some misinformed commentators have a view that farmers will be stopped from saving some seed from their crops. NZ Plant Breeding and Research Association (NZPBRA) President Tom Bruynel says there is no intent at all by the seed industry to get rid of farmer saved seed. He says the Association and the Arable Industry Group of Federated Farmers have been jointly saying that the right to save seed needs to be part of any updated plants legislation and there is agreement in principle that there be a fair and simple system of royalty collection for seed that has been kept back for sowing. International Convention for the Protection of New Varieties of Plants 1991 recommended that farmers will still be able to retain seed for sowing for their own private use on their own farm. On protected varieties the terms of purchase will provide that a small royalty be paid to the seed breeder.

**Institute for research, extension and training in agriculture (IRETA):** IRETA is one of the six Institutes of The University of the South Pacific (USP), set up in the 1980's to complement agricultural development efforts of the South Pacific Region. IRETA is located within the USP, Alafua Campus- Samoa, and has maintained strong collaborative relations with the School of Agriculture and Food Technology (SAFT) and the national governments of the Pacific- ACP countries. PURPOSE: To undertake programs in agriculture that will address the expressed needs of the USP member countries in the areas of research, information, agribusiness, consultancy and training. IRETA's vision is to provide quality living for the rural communities through agricultural development. It's mission statement is to contribute to the sustainable growth and development of the Pacific Island Countries by responding appropriately to their needs for research, extension and training in agriculture.

**Asia oceania agricultural proteomics organization (AOAPO), Tsukuba, Japan:** To promote agricultural proteomics activities in the Asia and Oceania region, the AOAPO was established in 2010. AOAPO activities cover a broad range of agricultural proteome research areas including crop, food, insect, microbial and animal proteomics. Promoting Agriculture Proteome Research Activities in the Asia and Oceania Region in the rapidly growing economies of Asia and Oceania, food security has become a priority concern. With a rising population, growing more food at affordable prices becomes even more important. This challenge requires integrated approaches to increase agricultural production and cope with environmental challenges. Proteomics can play a role in addressing the growing demand for food.

**Australian bureau of agricultural and resource economics and sciences (ABARES):** The ABARES is a research organisation within the Australian Government Department of Agriculture and Water Resources. It is located in Canberra, Australia. ABARES was established on 21 August 1945 as the Bureau of Agricultural Economics (BAE), and is also involved in commercial consultancy. It was merged with the Bureau of Rural Sciences (BRS) in 2010. The group's stated mission is "To provide high quality economic policy analysis and forecasts to enhance the competitiveness of Australia's

agricultural, fishing, forestry, energy and minerals industries and the quality of the Australian environment." ABARES maintains the AgSurf database which includes farm survey data on farm performance, production benchmarks, farm management, socioeconomic indicators relating to the grains, beef, sheep and dairy industries in Australia. ABARES has received funding from business and industry groups.

### Conclusion

By 2050, the world must feed 9 billion people. Yet the demand for food will be 60% greater than it is today. The United Nations has set ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture as the second of its 17 Sustainable Development Goals (SDGs) for the year 2030. Agriculture sectors will have to become more productive by adopting efficient business models and forging public-private partnerships and they need to become sustainable by reducing greenhouse gas emissions, water use and waste. We're already seeing and feeling the impacts of climate change with weather events such as droughts and storms becoming more frequent and intense, and changing rainfall patterns. Mankind's future ability to feed itself is in jeopardy due to intensifying pressures on natural resources, mounting inequality, and the fallout from a changing climate. Almost one half of the forests that once covered the Earth are now gone. Groundwater sources are being depleted rapidly. Biodiversity has been deeply eroded, as a result, planetary boundaries may well be surpassed, if current trends continue. The future of food and agriculture is intensifying pressures on already-strained natural resources. At the same time, greater numbers of people will be eating fewer cereals and larger amounts of meat, fruits, vegetables and processed food -a result of an ongoing global dietary transition that will further add to those pressures, driving more deforestation, land degradation, and greenhouse gas emissions. Alongside these trends, the planet's changing climate will throw up additional hurdles.

Given the limited scope for expanding agriculture's use of more land and water resources, the production increases needed to meet rising food demand will have to come mainly from improvements in productivity and resource-use efficiency. However there are worrying signs that yield growth is levelling off for major crops. Since the 1990s, average increases in the yields of maize, rice, and wheat at the global level generally run just over 1 percent per annum. To tackle these and the other challenges outlined, "business-as-usual" is not an option, The future of food and agriculture argues, major transformations in agricultural systems, rural economies and natural resource management will be needed if we are to meet the multiple challenges before us and realize the full potential of food and agriculture to ensure a secure and healthy future for all people and the entire planet.

"No race can prosper till it learns there is as much dignity in tilling a field as in writing a poem".-Booker T. Washington

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