

15 Years of NAFRI's Research Contributions to Agriculture and Forestry Sector Development *(presented at 15th NAFRI anniversary 9 April, 2014)*

The National Agriculture and Forestry Research Institute (NAFRI) was established on 19 April, 1999, by the amalgamation of several research centers and stations (some of them are: crops, livestock, fishery and forestry), for the purpose of implementation of holistic research in a more systematic and coordinated manner, to serve the needs of the whole country. The main aim in creation of NAFRI was to play the role of the leading institution on management and implementation of research and facilitate technical policy formulations for agriculture and forestry sector. In addition, contribution to the effective and sustainable agriculture and forestry development.

I. Structure of the organization.

NAFRI was established in April 1999 a Research Organization, and consisted of three divisions: 1. Administration, planning and Cooperation, 2. Research Management, and Database and 3. Strategy Management and included nine research centers on agriculture and forestry sector. Out of nine, seven research centers were located in the Vientiane Capital, and one each in the Northern Agriculture and Forestry Research Center in Luang Prabang and the Coffee Research Center in Champasak. The total staff amounted to 238 members.

Day by day, research activities have increased, methodology developed and upgraded appropriately to meet social demands and expectations of the country. At present, NAFRI has two established divisions: the Administration and Finance Division, and the Planning and Cooperation Division, In addition, there are 11 research centers relevant to agriculture and forestry sector, out of which, six research centers are located in the Vientiane Capital. In the northern part of the country, one research center each is located in Luang Prabang and Luang Namtha. Three research centers in the southern part of the country are located, one in each province: Saravan, Savannakhet and Champasak. The current permanent staff stands at 508 employees, They all have diversified professional backgrounds in several major fields, holding graduate qualifications relevant to agriculture and forestry sector. Professionals have graduated from local and foreign institutions, obtaining high level domestic and international qualifications such as B.Sc, M.Sc. and Ph.D. They are both permanent and contracted staff.

II. Human Resources Development

Since mid-1999, the research activities/programs have vastly increased, but the number of specific experts and researchers in different and specific fields have simultaneously not been raised, to matched the needs. For this reason, the Board of Directors of NAFRI made a great effort to support a capacity building and upgrading program for their employees and researchers, to attain high standards of research. Achievements in this respect are reflected in the table given below:

Number of NAFRI researchers and staff

No.	Educational level	Year 1999	Year 2014
1	Ph.D	05	(*) 17
2	M.Sc	22	83
3	B.Sc	50	151
4	Higher	49	41
5	Federal	68	17
6	Primary	34	11
7	Non-level	10	7
8	Contracted staff	101	183
Total Staff		239	508

Remark: (*) and plus 8 staffs are going on Ph D study-abroad

Further, NAFRI was instrumental in upgrading research and management capacities of staff at central and local authorities. Provincial and district level intensive and on- the-job trainings have been imparted to more than 6,500 staff members and over 2,400 farmers. At present, NAFRI research network is expanding in all provinces by establishing the research centers and station responding to the need and the potential of provincial development strategies.

III. Research Achievements and Contributions to the Agriculture and Forestry Development

Based on a directive and guidance of the Ministry of Agriculture and Forestry, NAFRI has implemented duties, roles and responsibilities to implement: surveys, research on variety of production and technology development on agriculture and forestry, through the production areas zoning, by improving and developing new varieties (seeds, breeding), development of techniques and technologies, from research into the legal aspects for sustainable management and for applications and agriculture and forestry policy research such as:

1. Rice breeding :

- Soils suitability survey and biodiversity inventory.
- Seed collection across the country: 13,351 samples of rice varieties, 136 samples of traditional corn varieties, 108 samples of potato, 22 samples of sweet potato, 88 samples of beans, 105 samples of millet and 87 samples of wild sugarcane. Lao traditional 12 rice varieties have been screened and used, such as: Hom Nangnuan , Khainoy Loueng, 5 varieties of non-glutinous rice, 2 varieties of aromatic glutinous black rice, 2 varieties of aromatic non-glutinous black rice and 1 variety of non-glutinous black rice. In those samples, 10 varieties are resistant to the leaf blast disease, 2 varieties resistant to drought conditions and 3 varieties have an aromatic gene.
- Best rice variety improvement achievements:
 - Several rice varieties to ensure food security
 - Potential rice varieties for commercial production e.g.
 - Hom Savanh non-glutinous rice
 - Vientiane 450-1 and 450-2
 - TDK11 is suitable for rainfed cultivation system
 - TDK1, TDK49 are appropriate for a rainfed and irrigated cultivation system
- Climate change adaptation
 - TDK8 is suitable to upland areas and drought condition

- TDK1 sub-1 variety can tolerate flooding areas for 21 days for survival.
- 450 years Hybrid corn variety and a number of others crop varieties.

2. Coffee

- Gathering a mature parental coffee for 10 line varieties. 48 line varieties were selected in Arabica Catimor, as 8 dominant lines could be sorted and 2 lines from the consumer popularity: SJ133 and T8667 and preparation of the register of Lao coffee varieties.
- Coffee seedling production with an average of 3,000,000 seedlings per year

3. Vegetables and fruits:

Traditional vegetable varieties collected for 2,140 species across the country: 567 samples in upland areas, 103 samples in plateau areas, and 1,399 samples in lowland areas. More than 100 ornamental plants were gathered and the best varieties from them, traditional spicy adapted to an appropriate local conditions, resulting in high yields, and climate change adaptation. Besides, vegetable seeds produced around 9,840 kg with an average of about 1 ton per year and production of the fruit tree seedlings, reaching more than 2,000,000 seedlings in 19 species.

4. Livestock:

The Lao indigenous cattle breed has been improving by using good performance bulls, such as:

- Crossbred cattle production aims to increase indigenous cattle weight by artificial insemination, using a Red Shindi bull, and feed improvement that increased weight from 180 - 200 kg to 360 - 380 kg.
- More than 1,300 pigs and 80,000 poultries per year were produced as meat for markets..
- Best forages have been tested and selected for forage management and improvement from 150 line varieties of grasses with farmers participatory adoption
- Improving pastured land, more than 2,000 hectares, for cattle production in focus areas of Louangprabang, Xiengkhouang, Bokeo provinces.
- Services on livestock raising management and supply seeds for forage amounting to 361 tons (41 tons of seeds and 320 tons of stumps), which were used for grassland, about 5,084 hectares and enabling feed 61,000 cattle per year.
- Services extended on artificial insemination for 1,180 cows, and 575 calves were produced. Besides, service on cattle's frozen sperm for 2,500 cylinders to farmers across the country.

5. Fishery:

Identified more than 500 species of the natural fish species in Lao P.D.R and out of them, more than 45 species are important for economic perspective. These play a role for commercial production as main income generation for farmers. Recently, there are 17 potential indigenous fish species identified for raising for consumption and research, as commercial commodity (e.g. Pa ZiuyMakmaior Striped catfish (*Pangasianodonhypophthalmus*), Pa Khuengor Asian Redfin Catfish (*Hemibagrus wyckioides*), Pa KotLueong (*Hemibagrus filamentus*), Pa ZiuyHangleong (*Pangasius krempfi*), Pa Kaeng (*Cirrhinusemolitorella*), Pa Phia (*Labeochrysopehadion*), Pa Phorn

(*Cirrhinus mircrolepis*), Pa Eaun (*Probarbusiullieni*), Pa Sakang (*Puntioplitesfalcifer*), Pa Kahoe (*Catlocarpio siamensis*), Pa Menh (*Osphronemusexodon*), Pa Kadert (*Trichogastermircrolepis*), Pa Salid (*Trichopoduspectoralis*), Pa Eiithai (*Osteochilushasselti*), Pa Pak (*Barbonymusgoniontus*), Pa Boo (*Oxyeleotrisarmorata*), Pa Kheng (*Anabas testudineus*) and 09 exotic species (imported specie)e.g. Pa Nin (*Oreochromisniloticus*), Pa Nai (*Cyprinuscarpio*), Pa Malikan , Pa Lohou (*Rohitarohita*), Pa Kadla (*Catlacatla*), Pa Ketlaeb (*Hypophthalmichtysmolitrix*), Pa Huanhai (*Hypophthalmichthysnobilis*), Pa Kin nha (*Ctenopharyugodonidellus*), and Pa Doukphan (*Catfish spp*)).

Herein, there are 4 species from Mekong river that is an economic essential prospect and expand for raising in wide range, e.g. Pa Khueng (*Hemibagrus wyckioides*), Pa Phorn (*Cirrhinus mircrolepis*), Pa ZiuyMakmai (*Panggasia nodomhypophthlmus*), and Pa Pak (*Barbonymus goniontus*).

- Study on the life cycle and growth of Mueng Ngoy shrimp - indigenous shrimp in Luang Prabang, and also training on sustainable shrimp harvesting management for villagers.
- Provided a good broodstock for producing an indigenous and exotic fish species averaged about 30 million fishes per year, contributed to network stations and entrepreneurs.
- Integrated raising system on fish with livestock, fish in pond, fish in paddy fields, fish in small ponds, and cage culture in stations, farms and family level. Study on participatory fish management in reservoirs, and farmers' participatory management of Bo shrimp.

In addition, the fish pathway technology had been demonstrated in Pakpueng reservoir, Bolikhamsay province. This is a new technique introduced to Laos and suitable for adoption in a wide range of applications.

6. Forestry:

- Completed surveys and established 102 tree sources of the plantation and natural tree seed sources, including 28 species, 6,890 seed trees, in a total area of 9,338 hectares, covering 17 provinces. They produced about 60,000 kg seeds per year. Moreover, they all have a location mapping, legal decree on tree seed management at the macro level with local, and a draft of tree seed regulations for using their seed and tree sources.
- Completed study of 2 reforestation areas after tree logging and slash and burn agriculture system in Bolikhamsay Province (108 hectares) and Oudomxay Province (6 hectares).
- Survey on rattan in a total area of 25,000 ha, which covers 4 provinces, 10 districts, and 45 villages. Given that 2 zones have recognized the international certification, the area covered 5,457 hectares and could harvest about 200,000 lines of rattan. Rattan plantations with 100 farmer-households for shoot production, could create income generation exceeding an average of more than US\$ 100 per household per year. Rattan seedling production technique had been developed for more than 10 species.
- Surveys completed on bio-diversity of tree for 100 species of trees and 800 species of non-timber forest products (NTFPs), and collected 10,000 samples of tree specimens.
- Land allocation and management of NTFPs, especially bamboo forests (bitter shoots), rattan and others.
- Tree seeds collected averaging 5,000 kg per year and 2,000,000 seedlings per year were produced.

7. Agriculture and Forestry Policy Research

Regarding the policy research, it emphasizes development on policy, legislation, practical measures, production models, information dissemination and media coverage on science and technology, to support of implementation plans and programmes, to provide policy briefs on different issues for decision makers. Examples are: food security, commercial production, industrial and modernized agriculture development in the future, as summarized below:

- Contributed to outline and improve contents of the Agriculture Strategy to 2020
- Implementation of the policy research on agriculture and forestry development (or Policy Think Tank)
- Created a document on the agriculture, farmers and rural development, in cooperation with the Strategy Research Institution of Vietnam (or TAM NONG)
- Involved in a national research program to develop a document "agriculture and rural development" and conducted study on situation of the industrial and modernized renovation of agriculture and forestry sector in Lao P.D.R.
- Establishment of many policies related to priority of government programs such as: food security, commercial production and producer groups.
- Developed research works related to the value chains of commercial crops production, e.g. rice, corn, rubber and problems related to production.
- Developed an information technology system to connect to the internal and external networks, through creating a NAFRI website, developed the Lao Agriculture and Forestry Database (LAD), improving the NAFRI Library System (NALIS). Moreover, developed a website and databases for several projects such as: TABI, IRAS, PRC, NISM to collect, gathering data and maintained data in a system.

Besides these, Lao agriculture and forestry research journal, newsletters, posters and leaflets are regularly published in order to disseminate research results and information for agriculture and forestry development to a wide range of users in the society.

IV. The Agriculture and Forestry Research Strategy Development

NAFRI has recently completed development of a draft of the Improvement and Development on Agriculture and Forestry Research Strategy and Vision from 2015 until 2025: the research works have to support agricultural production to ensure the reliability of the national food security, sustainable agricultural development and agriculture commodity production. The potential to develop an economy based on four major research programs: 1. Agro-biodiversity, 2. Productivity improvement, 3. climate change adaptation, and 4. Agriculture and Forestry Policy Research.

V. Cooperation and Investment (internal and external organizations)

NAFRI has created and developed cordial relationships and cooperation with several domestic and foreign organizations, involving assessments, studies, and research on variety of techniques, information sharing, and personnel development. Details are given below:

- Collaborate with many different Ministries, line Departments under the Ministry of Agriculture and Forestry and other line agencies of the government such as: National University of Laos, Forestry Fund, Environmental and Social Protection Fund,

Science Research Fund managed by Ministry of Science and Technology, Ministry of Public Health, and Provincial Agriculture and Forestry Offices across the country.

- The regional offices of International Research Centers in Lao PDR, are located in NAFRI campus e.g. IWMI, JIRCAS, CIAT, IRRI, IRD.
- Cooperated with private companies, entrepreneurs: Oji Lao, Birla Lao, StoraEnso, Sun Paper, Bualapha, Lao Thaihua ...
- Coordination and networking with international organizations e.g. SIDA, FAO, SDC, UNDP, GIZ, AFD, WWF, SNV, MRC, CIRAD, IUCN, SADU, CSIRO, SIDA-MEKARN, DANIDA, Darwin Initiative UK, SUFORD / WB, WB-Finland, WWF, NACA, UNDP / GEF / IUCN, NUDP, IDRC;
- Play a role as Coordinator and networking with regional organizations e.g. ACIAR, CSIRO, AKECOP, ITTO, RECOFTC, FIP, FORSPA, TCP, FGR, FSCAP, KNA-NAFRI/FRC, FORRU-CMU, APAFRI, AFOGEN, IUFRO, SEMEO. Likewise, collaboration with various universities and research institutes abroad, such as:
 - International Soil Management Institute,
 - Vietnam (Institute of Agriculture Planning and Design, Research Institute of Agriculture No. 1 (RIA No 1), Institute of Political Strategy and Agriculture Research of Vietnam).
 - Universities (Kyoto University, Nagoya University, Hawaii University; YAAS; KSU; KKU; CMU; UCD) and Hungary.

VI. Research Investment:

In the past the NAFRI has mobilized investments for research implementation from both domestic and foreign donors, including international organizations. However, based on the needs and necessity of working on continuously in successive research for development, those investments are insufficient, and NAFRI must work more to obtain additional financing.

VII. Complimentary Awards of the 15th Anniversary of NAFRI:

Based on operations, the role played and mandate of NAFRI, during the period 1999-2014, NAFRI has received two national labor medals of grade II and grade III. Also, it received 63 certificates of appreciation, having been praised by domestic and foreign institutions and some amount of praise received from international organizations.

Personal individual awards to commemerate this occasion are summarized given below:

1. Grade I Labour-Medal	2 persons
2. Grade II Labour-Medal	18 per.
3. Grade III Labour-Medal	63 per.
4. Labor Medal	68 per.
5. Government certificate	220 per.
6. Ministry of Agriculture and Forestry certificate	114 per.
7. Ministry of Agriculture and Forestry congratulations	106 per.

Especially at 15th NAFRI Anniversary celebration, the Board of Director of NAFRI agreed to make the following awards:

1. The outstanding leadership	15 persons
2. The Best Research Managers	52 per.
3. The Best Researchers	19 per.

Under the present conditions, the agriculture and forestry research has to engage urgently to develop innovative and appropriate concepts and ideas to match the actual situation and circumstances faced in the country. Based on the lessons of the past 15 years, reflects the advantages that must be continued, developed and expanded, in order to serve the country for productivity improvement and agriculture modernization. Besides, the constraints have to be considered to be improved and taken into consideration in the finalization of Agriculture and Forestry Strategic Research 2025 and Vision 2030 which will be presented at the symposium on 09-10 April 2014.

I, as the DG and on behalf of NAFRI researchers and staff, extend my sincere thank and best wishes to H.E. Vilayvanh Phomkhe, Minister of Agriculture and Forestry, H.E. Professor, Dr. Boviengkham Vongdala, Minister of Science and Technology, to be very healthy, great success in guidance and continuing direction on agriculture and forestry research for development of a better future for the people of the country.

Also, my sincere thank and best wishes are extended to: the Board of Directors, Departments, Divisions, Centers, International organizations, donors, both domestic and foreign experts, and all distinguished guests, to be healthy and wealthy, great success in your responsibilities and work.