Keynote address at the 7th National Agronomists' Workshop 2011*

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Challenges and opportunities of agriculture with reference to agronomy for seed and food security in Nepal

To address food and seed security in Nepal, there are innumerous challenges of agriculturists in general and agronomists in particular. Some of the most relevant challenges of agriculture are as the followings:

- Food insecurity i.e. 0.316 million tons (2009/10) food deficit in Nepal and 39 hill districts and 4 million people suffering from hunger
- Negative effect of climate change on food crops
- Low priority of government to agriculture

Table 1. Comparison of the national budget of the government of Nepal (GoN) with ministry of agriculture and cooperative (MoAC) and Nepal agricultural research council (NARC) for the fiscal year 2067/68 (2010/11) budget in (NRs'000)

Annual budget of GoN (NRs)	337,900,000
Annual budget of MoAC (NRs)	10,523,526
MoAC budget of national budget (%)	3.11
NARC budget (NRs)	98, 000
NARC budget of national budget (%)	0.29
NARC budget of MoAC budget (%)	9.32
Minimum budget outlay that should be allocated for agriculture for its contribution to AGDP (10% of AGDP) NRs.	36,670000
Minimum budget outlay that should be allocated for agriculture research (0.5 to 1% of AGDP) NRs.	1,800000 to 3,600000

- Agriculture is grossly underfunded and it is not getting functional priority by the government of Nepal. At least agriculture should get 10% annual budget of its contribution to AGDP. To meet the challenge of food insecurity budget for agriculture should be increased by many folds aside from providing other logistic support as well.
- Agriculture in Nepal is in low priority since 1990 and budget allocation for it was 2.47% (2006/07), 2.45% (2007/08) of the national budget. And up to now NARC nas

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been placed in priority 2 (P2) which means budget release for 3rd trimester of the fiscal year is not sure as a result research activities after 2nd trimester are seriously hindered. In contrary to this, in SAARC region budget for research are allocated in 1st priority and it is around 0.3% to 2% of national outlay whereas in Nepal it is about 0.2% of GDP as reported by Dahal and Khanal in 2010 *(Republica Daily*).

- Pascal Lamy, WTO, president (2010) admits that agriculture subsidy should increase 4 times as that of industry to mitigate problem of food insecurity.
- There are no recommended varieties of underutilized crops (buckwheat, oat, naked barley, fox tail millet (*Kaguno*), poroso millet (*Chino*), amaranthus (*Latte*) for high hills and trans-Himalayan regions of Nepal to sustain food security and there is dire need of quality seed of released varieties of important food crops.
- Should promote Annapuran series wheat varieties for high hill domains to address food insecurity.
- Resurgence of virulent insect pest and diseases of major crops i.e. (yellow rust, grey leaf spots, blast of rice, red ants, potato tuber moth, blight of potato, white grubs and many more have been causing reduction in food production.
- No systematized study of fodder species in high hill domains for feeding animals in winter season and fodder lean periods to increase their productivity.
- Resource conservation technology (RCT) in wheat not tied up with in-built program of extension program.
- Conservation agriculture (CA) still in infancy.
- Lack of scientific agronomic practices to cope up with drought/flood prone areas as mitigation and adoption of climate change strategies.
- Mass scale transactions of low quality agriculture inputs flow in the market (seed, fertilizer, pesticides and hormones) have been serious bottleneck of modern agriculture.
- Recommended packages of practices (PoP) have not been massively up scaled to clienteles.
- Wide range of attainable yield gaps situation in Nepal (Figure 1).

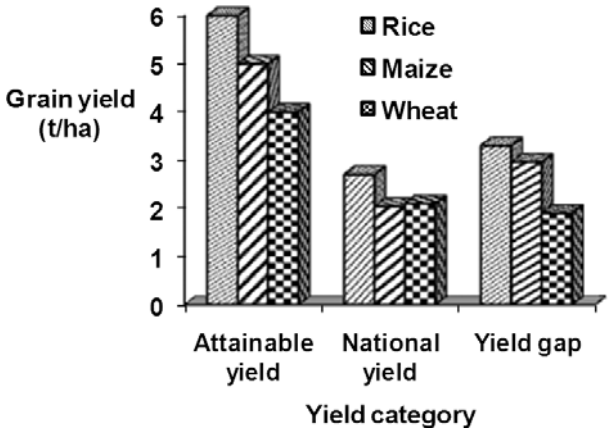

Figure 1. Yield gaps of staple crops in Nepal

Proper agronomic practice for these crops can increase yield level in farmers' field condition. This includes proper time and method of sowing, intercultural operation, plant protection, plant population maintenance, improved variety and other pre harvest and post harvest practices for increasing crop productivities as well.

Opportunities of agronomists

Despite these gloomy pictures, there are vast opportunities of agronomists which are as follow:

- More focus should be given to address cash crops for food security and income generation in food deficit regions of mid and far western hills.
- Agronomic study to address problems encountered through introduction of new technology (hybrid varieties) by farmers and some agencies e.g. sterility in hybrid maize in Terai and rice in far western region.
- Location specific agronomic research to address yield gaps.
- Site specific fertilizer recommendation on the basis of soil tests to increase productivity.

Table 2. Edible cereal requirement and balance ('000 tons)*

F/Y	1964/65	1984/85	1994/95	2007/08	2008/09	2009/10
Production	2212	2595	3398	5178	5160	5293
Requirement	1919	2500	3883	5157	5293	5609
Balance	293	95	-485	21	-133	-316

* MoAC 2010

Table 3. Area production and productivity of cereal crops in 2009/10* against projected productivity as of 2009/10

Crop	Area ('000 ha)	Production ('000 mt)	Productivity (mt/ha)	Projected productivity to meet food requirement (t/ha) as of 2009/10	% increase of projected productivity over 2009/10 to meet food requirement
Rice	1556	4524	2.9	5.013 (45% share in food sufficiency)	72.9
Maize	875	1931	2.206	2.674 (30% share in food sufficiency)	29.7
Wheat	695	1344	1.93	2.805 (25% share in food sufficiency)	45.3
Total	3126	7799	2.5	2.5 (100% share in food sufficiency)	

* MoAC 2009/10

- Looking at these scenarios, agronomists can contribute a lot to address problem of food insecurity. Agronomic studies are location specific ones and efforts are needed to

develop technologies suited for different agro ecological domains across the country. Improved seed produced in-situ alone can address 10-15% yield increment without incurring any additional inputs. Improved crop husbandry practices such as plant population maintenance, timely sowing and conservation agronomic practices can contribute immensely for sustainable agriculture. There is a need to completely develop improved packages of practices to boost crop productivity in important food crops and such literatures should be massively distributed to clienteles by researchers with strong involvement of service providers. To carry out these practices, agronomists' role is always vital.

Table 4. Required investment in agricultural R&D to attain food security and to reduce poverty and hunger in South Asia* (Current price in million US$)

Country	2002	2010	2015	2020	2025
Scenario 1 : 2.14% agricultural growth (to attain national food security)					
Bangladesh	101.2	143.0	177.5	220.3	273.5
India	1258.3	1778.0	2206.9	2739.3	3400.0
Nepal	24.1	34.2	42.4	52.6	65.2
Pakistan	158.8	224.4	278.5	345.7	429.2
Sri Lanka	47.4	66.9	83.1	103.1	128.0
South Asia	1589.8	2246.4	2788.3	3461.0	4295.8
Scenario 2 : 2.14% agricultural growth (to attain national food security)					
Bangladesh	101.2	162.1	217.6	292.3	392.3
India	1258.3	2015.6	2705.8	3632.6	4876.5
Nepal	24.1	38.7	52.0	69.7	93.6
Pakistan	158.8	254.3	341.5	458.4	615.5
Sri Lanka	47.4	75.9	101.9	136.7	183.5
South Asia	1589.8	2546.7	3418.8	4589.7	6161.4

* Source: Singh, 2009, APAARI

- To make Nepalese agriculture as competitive as that of SAARC region, investment on agriculture research for development should be tailored with the priority set by these countries as well. Only then can competitiveness of Nepalese farmers' safe guarded. Report suggests that Nepalese agriculture is grossly underfunded and there is a need to substantially increase investment on agriculture in general and research in particular to meet the present challenges of agriculture research for development in comparison to the SAARC countries. These challenges can be addressed by the active involvement of agronomists in their field provided logistic and financial facilities are met by the institutions concerned in Nepal.

Table 5. Incremental effects of government spending on poverty in India

Investment sector	Decrease in number of poor, per million Rupees spent	Rank
Research and Development	91.4	II
Irrigation	7.4	V
Roads	165	I
Education	31.7	III
Power	2.9	VIII
Soil and Water	6.7	VI
Rural Development	27.8	IV
Health	4	VII

Source : Fan et al; 1999

- It is well anticipated that investment on roads followed by research and development could give maximum benefit to alleviate poverty in the country. Hence, functional priority on agriculture could be an alternative to uplift rural livelihood of Nepalese.

Adoption and mitigation strategies of climate change

Now climate change has become a buzz word in general and particular to agriculture. There are ways to address vagaries of climate change by following strategies of adoption and mitigation some of them are delineated below:

- Improvement of degraded land
- Rain water harvesting and soil moisture conservation
- Slope stabilization and management
- Agronomic management of high/low temperature stress
- Crop diversification
- Community based seed production and user groups formation for seed production
- Climate change adaptation and resource conservation practices to address rainfed agriculture
- Development and massive dissemination of drought /flood tolerant varieties of crops with complete packages of practices in domains appropriate

Some important issues about contemporary global agriculture

- Global food price index (FPI) is highest during 2010/11 (WB, 2011)
- If scenario continues millennium development goals (MDGs) could not be achieved for developing countries and it will take 2150 to achieve the goals
- Food price inflation for cereal (17.6%) and legumes (36%) Nepal Rastra Bank (2011, Falgun)
- In developing countries 60% of earning earmarked for food items i.e. 45% (cereal) 15% (non-cereal)

- Agriculture should make the policy issue (Agriculture adviser's report UK, 2011)
- 1 billion people sleep without adequate food and 1 billion people over eat (equity problem)
- Problem faced in agriculture is mainly due to flood, drought, fire, and conflicts
- Present problem of mass uprising in Middle east, Africa, Asia, and Latin America as a result of high food prices and food unavailability

Way forward for Nepalese agriculture

- Agriculture should be a policy issue and should get topmost priority by the government
- Morale of agriculture workers should be boosted
- Filed level workers should be at least graduate standard
- There should be two graduates (crop and livestock) in each Village Development Committees i.e. youth employment for about 9000 agriculture graduates in Nepal to address food insecurity and unemployment
- Research, extension, and teaching should work hands in hands to address problem of food, feed, and nutritional insecurity
- Most of the central based offices should relocated into domain based sites
- Immediately establishment of at least one agriculture university in each development region to address location and site specific problems
- Compulsory curriculum of agriculture in high school level
- University curriculum should be based on Nepalese agriculture perspective at least for academic research studies

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