

# Influence of Type of Farm Input Subsidies on Maize Production in Trans Nzoia West Sub County, Trans Nzoia County, Kenya

Barasa Protus Wafula, Dr. Daniel Nyantika, Dr. Tom George Ekisa and Dr. Mamboleo Denis Mabaya

Degree of Master of Arts in Geography Department of Geography, Faculty of Arts and Social Sciences. Kisii University P. O Box 408-10200 Kisii

**Abstract:** Food security all over the world is the biggest challenge affecting humanity; the problem is even more serious among the low-income and food shortage nations. In order to achieve reasonably high food produce to deal with this situation, sustainable strategies are required. One of such strategies is what this Study wished to address. Hence, the Study made an endeavour to find out the challenges of farm inputs subsidies on maize production in Trans Nzoia West Sub County, Trans- Nzoia County, Kenya. The study was of significance to stakeholders in the Agriculture sector ranging from The National Ministry of Agriculture and the County; agricultural staff implementing the project and the farmers. The study was based on Social Protection Theory. A descriptive survey design was used since the study was both qualitative and quantitative in nature. A sample of 160 was selected from a target population of 1510 for data collection. Questionnaire and an interview schedule were used as tools of primary data collection. Data instruments were pretested in Trans-Nzoia East Sub County to test their reliability and viability. Data was collected, coded and analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 findings showed that there was a significant effect of subsidized seed given that majority of the farmers produced bags using certified seed. It was recommended that the government should appoint distribution points where input subsidies should be channeled through location Agriculture Officers' rather than the National Cereals and Produce Board.

**Keywords:** Farm subsidies, free inputs, Incentives.

**Citation:** Barasa Protus Wafula, Daniel Nyantika, Tom George Ekisa and Mamboleo Denis Mabaya. 2018. Influence of Type of Farm Input Subsidies on Maize Production in Trans Nzoia West Sub County, Trans Nzoia County, Kenya. International Journal of Current Innovations in Advanced Research, 1(6): 57-66.

**Copyright:** This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. **Copyright©2018;** Barasa Protus Wafula, Daniel Nyantika, Tom George Ekisa and Mamboleo Denis Mabaya.

## Introduction

Many nations have made efforts to fight poverty through making radical changes in the lifestyles and more importantly in agricultural sectors and recognizing the immense variations needed to revamp farm production. The intensive use of farm subsidies has a long history of use in the world. According to Duvauchelle (2012), majority of farm and agricultural subsidy programmes started in the late 1960s and 1970s, even though some countries invested in agricultural subsidies as early as in 20th century. a case in mind are countries like United states of America who started subsidizing farm input subsidies as early

as in 1933 through a program they dubbed as 'the Agricultural Adjustment Act' and the other its successor, The U.S. Agricultural Act of 1949. Farm subsidies have been made popular, and countries do favor them at times while dropping them at other times. For example, Duvauchelle (2012) asserts that in New Zealand the government supported heavy farm subsidies until 1984, when they were dropped. Modern intensive agriculture depends heavily on timeliness of the farming operation for enhanced crop yields and profits (Khan, 2011).

According to Crawford *et al.*, (2008), the all for subsidies is simply attractive on several grounds. One is that many governments find it difficult to resist the call for subsidies from the farmers due to political reasons, the subsidies seem easy to implement at both levels of governments. To some, moreover, the sight of the government investing directly to beat the market forces, often regarded with a pinch of salt to start with, is welcome. Moreover, in parts of the emerging world novel advice to avoid subsidies is treated with contempt, since they usually come from the developed world where farmers are heavily subsidized and hence the subsidies are seen in the lenses of hypocrisy.

According to Walkenhorst (2007), 'inefficiencies and provision of the amount of subsidies frequently is undermined further by cost of production by most small scale farmers in developing countries who grow majorly grow food crops for subsistence, they cultivate food crops mainly for home use with a small number of the farmers growing of cash crops in small quantities mainly to fill house hold household needs.' According to the World Bank Report (2007) further states that 75 % of rural populations in the third world being generally poor and threatened with food security, calling for a more hands-on approaches with more appropriate and better strategies that can spare and encourage food sufficiency hence, addressing incomes of the lower end populations. That is why the research was done to ascertain the challenges of farm inputs subsidies on maize production in Trans Nzoia West Sub County.

According to FAO (2015) the demand for food is raising every day and it is expected to grow in an upward trajectory of by 20 per cent from the current by 2030. As this trend remains this way, hunger continues to be detrimental to vast populations to a tune of about 795 million people all over the world between the years 2014-2016 and that many of the people in these bracket of hunger stricken populations are found in developing countries, representing 13 % of those regions' populations. The United Nations in the new accelerated sustainable development goals recognizes the urgency of eliminating hunger in the world by ensuring that nations commit to and develop appropriate policies geared towards sustainable food production. On this breathe therefore, this study aims at acting as a vehicle albeit as one of the many approaches that can be adopted to ensure food security though maize production sub sector in agriculture, by identifying the challenges that if addressed, can go a long way in improving food production as we strive toward achieving vision 2030.

According to New York (2016) The UN Report titled 'World Economic Situation and Prospects 2016,' notes that, 'many nations seek after approaches and techniques for guaranteeing food security, which incorporate subsidies for stable food production.' The report recognizes that some of these strategies may not be financially suitable or ideal as they influence diversification and structural change, but does not rule out their use for strategic and defined purposes. In this sense, the report calls for "fair and predictable international agricultural markets", which are necessary for food security, and which may include policy driven subsidy schemes. Similarly, the Food and Agriculture Organization (FAO) of the United Nations asserts that "Markets are central to the successful management of structural

transformation, but the process of structural transformation has never been driven entirely by market forces” (FAO, State of Agricultural Commodity Markets 2015-2016).

According to Morris *et al.*, (2007); Druilhe and Hurle (2012), says that before the implementation of structural adjustment and stabilization programs in the early 1990s, that were promoted by the world Bank and the International monetary Fund (IMF), most nations found in Sub-Saharan Africa (SSA) enforced farm input subsidies, that were phased out so as to conform with the agreements with the world Bank and IMF. However, according to DANIDA, (2011); Druilhe and Hurle (2012); Gilbert *et al.*, (2013) in recent years, many countries in SSA have re-introduced these subsidies, including Malawi. The origin of farm and agricultural subsidy programs in the World for either; developed, developing or under developed country should be inclusive as suggested by Duvauchelle (2012), the government should formulate policies that discourage subsidies that are funded by tax payers money in the name of boosting farmers' production. In addition to the national government's NAAIAP project the county government has set aside Ksh. 224 million for buying fertilizer and farm machinery. This in reference to, a move to help local farmers practice conservation agriculture to increase crop productivity and attain food security , in Trans Nzoia West Sub County, the County pumped Kshs. 70 million into buying subsidized fertilizer up from Kshs. 30 million in 2014 (Daily Nation March, 30th, 2017).

Kenya set to embark on a National Accelerated Agricultural Input Programme (NAAIAP) (2009) to boost food security, agricultural input use, input market development, and agricultural productivity. at first the government planned to subsidize fertilizers and maize seed for some Sub-Counties, it's was later enlarged to national coverage with plans to supply at least 2.5 million farmers with maize seed and fertilizers for 0.4 ha each, with vouchers issued to targeted farmers (disadvantaged households with land) and subsequent redemption through private input sellers who qualifies for trade credit guarantees. According to studies conducted by Sikobe (2008), Farmers will also benefit from linked extension, cereal banks, warehouse receipts, and participation in farmer groups. This study endeavoured to find out whether the provision of subsidies influenced an increase in maize production in Trans-Nzoia West Sub County.

Food security is maybe the greatest problem confronting humanity in the world today. The problem is even more serious in lower-income, food shortage nations. To accomplish manageable increment in the production of food in developing countries requires strategies that address four key measurements of economical horticulture and rural advancement specifically individuals, organizations, knowledge and the environment (FAO, 2002). Kenya joined the ranks of Sub-Saharan African (SSA) countries in implementing a targeted input subsidy program for inorganic fertilizer and improved seed. To achieve this, The National Accelerated Agricultural Inputs Access Program, “Kilimo Plus” initiative, was established in 2007. The implementation of the programme from the year 2007/08, aimed at providing 50 kg each of basal and top dressing fertilizer, and 10kg of improved maize seed to resource poor smallholder farmers. The ultimate goal of these farm subsidies were to increase access to inputs, raise yields and incomes, improving food security, and reducing poverty. However, despite the implementation of the program in Trans-Nzoia County has witnessed food insecurity which is still wide spread among smallholder farmers. Kenya Agricultural Research Institute (KARI) (2005) attributes the declining maize production to continuous cropping of maize, removal of field crop residue for feeding livestock, overgrazing, burning of Stover to ease ploughing, resulting to the reduction of both the physical and chemical soil elements. In Trans- Nzoia West Sub County, the shortage of maize production has been

evident a situation that has led to marketers bringing in supplies to sell to local inhabitants at high prices; something that never was the case before. This raises doubts about the effectiveness and efficiency of the subsidy program. The study sought to find out the challenges behind the intense subsidy programme meant for Trans- Nzoia County.

### **Type of farm subsidy given and Sustainable Maize Production**

Many of AID's input projects to provide biological technologies have been seed projects. One of the five impact evaluations examined the Tanzania seed multiplication effort. Other seed projects reviewed by AID included maize in Kenya, rice and peanuts in the Central African Republic, vegetable seed in a number of Asian countries, wheat in Bolivia, corn and soybeans in Peru, and a broad-based commercial feed operation in Thailand. Biological improvements have been much more striking in wheat, maize, and rice than in sorghum and millet. Droppelmann Klaus (2009) pointed out that in West Africa, for example, there have been virtually no research improvements in drought-resistant varieties; this shortcoming has added to the complications of food production projects predicated on the existence of improved varieties. In most of these projects, the scientific, on-station seed development and multiplication efforts have been more successful than the off station distribution and utilization of the improved varieties (Droppelmann Klaus, 2009). In fact, projects are fairly rare which demonstrate both a simultaneous success in the development and multiplication of a well- adapted new variety and a successful farm-level use of that variety.

The Thailand seed project was notable for its success in (1) providing for a broad range of improved seed needs and (2) doing so through close collaboration with private seed companies (Solem Ray, 1985). According to Johnston and Kilby (1975), argue that 'Agricultural productivity and improvements have long been viewed as the foundation for economic prosperity and social development. In this sense, Evenson and Golin (2003) adds that Asia's Green Revolution which was initiated in the 1960s had a sole aim of developing fertilizer which was responsive to rice and wheat production.

Denning et al, (2009) portends that 'the national input subsidy programme should center around the utilization of urea (46% nitrogen) in view of its lower unit cost of nitrogen than the compound fertilizer known as 23-21-0 (which contains 23% nitrogen and 21% phosphorus).' He supports his argument to the fact that urea fertilizer, which can provide, more nitrogen to crops, is cheaper compared to phosphorus fertilizers. This is so on the grounds that nitrogenous fertilizers are subsidized more than Potassic and Phosphatic compost; the subsidy tends to profit increasingly the harvests and locales which require higher utilization of nitrogenous fertilizer when contrasted with the yields and areas which require higher use of P and K.

On account of fertilizer, the basic issue has been the unevenness in the utilization of NPK achieved by contortions in value proportion for Nitrogenous fertilizer. It has just caused across the board soil degradation and lower productivity which is becoming more intense with time. Therefore, as it is, presently, there is a need to advance balanced utilization of fertilizer which can be accomplished either by redistributing the available amount of fertilizer subsidies over NPK or by expanding subsidies on P and K such that agriculturists are instigated to utilize NPK in the correct extent.

This would not just check unpredictable utilization of one sort of fertilizer at the convenience of the other, yet in addition decrease inter-regional and inter-crop disparities in fertilizer utilization. Farmers barely give careful consideration to rising micronutrient inadequacies

which are influencing profitability, quality and productivity of fertilizer utilization. Huge endeavors are required for soil testing system to evaluate particular lacks at the provincial and sub-regional level. There is a need to take measures—including expanding the supply of such supplements and even subsidies – to rectify them (Evenson and Golin, 2003).

When drawing on experiences from Byerlee *et al.*, (2006) and Hazell *et al.*, (2007), it is plainly demonstrated that there is expanded efficiency for various sorts of farming items in nations with various attributes, and afterward the significant difficulties that should be routed to accomplish expanded profitability. Refinements are made first between various kinds of harvests and items (and certainly between various agro-environmental zones related with these). Maize, rice (prominently NERICA) and perhaps wheat (however this is a substantially less essential product in Africa) are grains with potential high reactions to critical interests in inorganic (and natural) fertilizer application (Byerlee *et al.*, 2006; Hazell *et al.*, 2007).

Proper selection of fertilizer types by farmers is outstanding among other possible factors like appropriate timing and method of application of fertilizers which would influence the farmers' capacity to utilize fertilizers successfully and proficiently. This is probably going to be especially the case with poorer farmers who don't access fertilizer for cash crop production and who are additionally less ready to get to improved seeds and extension advice.

As Dorward *et al.*, (2008) noted “Several challenges were noted from the Malawi fertilizer programme among which was the need to enhance program information sharing to the planned recipients and overall population; and deficiencies of fertilizers and befuddle of coupons and fertilizer types in a few regions” (Dorward *et al.*, 2008).

In one such case involving maize in Kenya, the (2017) Droppelmann report of 2009 indicates uniqueness in achievement since in most important aspects; Kenya's experience with hybrid maize seed is not replicable, at least in Africa. The initial boost given by large-scale commercial farmers, the significant long-term presence of foreign advisers and the aggressive private seed companies all mark Kenya's success as unique. To achieve high maize productivity, the quality of inputs is paramount.

According to Nyoro, (2002), high quality farm inputs are a prerequisite for high maize production. Among agricultural inputs, seed is perceived to have the best capacity of increasing on farm productivity since seed determines the maximum upper limit of crop yields and efficiency of all other farming inputs (MOA, 2004).

There has been considerable adoption of hybrid maize seed in the high maize potential. According to Ayieko *et al.*, (2005), and Tegemeo Household Survey 2004, certified maize seed usage in Kenya's high maize potential areas is 61% whereas 39% use retained or indigenous maize seed. There are cases of farmers using part of harvested grain, retained maize seed from previous seasons and open pollinated varieties (OPVs). Farmers who recycle grain are faced by risk of declined yields of between 5 percent for open pollinated varieties (OPV) and 30percent for hybrids (Pixley and Banziger, 2001). According to Langyintuo (2008), a study done to compare improved maize seeds sales volume showed a decline between 1997 and 2007 in Eastern and Southern Africa Countries with Angola reducing by 7% Zimbabwe by 2% and Kenya by 1%.

Farmers have also been discouraged from adopting certified maize seed due to past disappointments. Unscrupulous business people have infiltrated the maize seed market with

sub-standard maize seed packed in branded bags of known companies duping farmers to buy the products. As a result, germination has been poor leading to poor maize production. Due to this, small scale farmers have continued to lose faith in hybrid maize seed brands and resorted to uncertified seeds. As noted by Nyoro (2002), farmers who adopt this poor quality although certified seeds have had poor germination and low yields of certified maize seeds.

Soils in the once fertile high potential zones have continued to lose fertility as a result of a number of factors including mono cropping, burning of crop residue, inadequate fertilizer use and erosion. The remedy to this challenge has been to push framers into full adoption of fertilizer use which has seen an increase in usage especially in high potential zone (Sheahan, 2012).

To achieve optimal usage the government and other stakeholders have initiated programs aimed at enhancing access and accelerating fertilizer usage. In Kenya, National Accelerated Agricultural Inputs Access Program (NAAIAP) is one such program. The aim of the program besides improving productivity is to increase soil fertility. Organic fertilizer usage has however been low among small scale maize producers. According to Kherallah *et al.*, (2002), majority of small scale farmers cannot afford the cost of fertilizer. He also notes that inadequate supply and high transportation cost due to far off distances from farms to supply outlets also affect adoption and usage of organic fertilizer. Larson and Frisvold (1996) also note that low usage of organic fertilizer is partly due to inadequate supply and lack of affordable packaged fertilizer for farmers.

From the literature drawn above, it has been noted that there is a direct relationship between the quality of seeds supplied to farmers and the produce. This is the reason governments across the world have had heavy investments on research to produce quality seeds suitable for different topographies and climates. This is part of the motivation why this research made and endeavors to find out the correlation between the types of seed supplied to farmers under the subsidy programme and maize production as compared to the production the same farmers had before they were put under the programme.

## Method

This study adopted a descriptive research design with a targeted population of farmers and Ministry of Agriculture officials being a total of 1510. The instrument for collecting data was questionnaire. The pilot was done to determine the validity and reliability of the tools to be used in data collection process. Prior to the commencement of data collection, the researcher obtained all the necessary documents, including an introduction letter from the University and a permit from the National Commission for Science Technology and Innovation (NACOSTI. To analyze quantitative data, the data was first screened and arranged in a systematic manner. Qualitative data analysis was used to summarize Information gathered from interviews and secondary data into relevant themes according to the research questions. Multiple regression analysis was applied to test the effect of one variable to the other.

## Discussion

### Effect of Fertilizer Subsidy on Maize Yield

#### Significance of Fertilizer Application on maize yields

The researcher wanted to find out the significance of fertilizer application on maize yields. Table 1 shows the findings of the significance of fertilizer application on maize yields.

**Table 1. Significance of fertilizer application on maize yields**

Type of fertilizer	5-10		11-15		16-20		21-25		25 above	
	F	%	F	%	F	%	F	%	F	%
Inorganic fertilizer use after	0	0	0	0	23	15.33	87	58	40	26.67
Inorganic fertilizer use before	16	10.67	35	23.33	79	52.76	10	6.67	0	0

From table 1 it was found that majority of the respondents 58% realized an improved harvest of between 21-25 bags of maize with subsidized inorganic fertilizer; as compared to 52.76 of the respondents who argued that they had harvested between 16-20 bags of maize while using inorganic fertilizer before introduction of subsidy.

### Net saving per year

The farmers were requested to indicate the amount of money they saved with the introduction of subsidized inorganic fertilizer. Table 2 illustrates the responses of the farmers on the net saving per year on subsidized inorganic fertilizer.

**Table 2. Farmers' net saving per year**

Savings in Kshs	Frequency	Percentage
Below 30000	1	4.67
31000-40000	16	10.67
41000-50000	17	11.33
Above 50000	116	73.33
Total	150	95.33

As seen from table above, majority of the respondents 73.33% had a net saving of above Kshs 50000 after using subsidized fertilizer. This was an indication that they were value addition from subsidized fertilizer in comparison the fertilizer they were using before. Channel of distribution.

When the farmers were prompted to give the appropriate channel of distribution they preferred, they had the following preference in table 3.

**Table 3. Fertilizer channel of distribution**

Mode of distribution	Frequency	Percentage
Agriculture office	145	96.67
National Cereals and Produce Board	5	3.33
Total	150	100

Majority of the respondents 96.67% said they preferred agriculture office distribution as opposed to National Cereals and Produce Board.

The agricultural officers were also asked to give their opinion on the adequacy of the amount of farm subsidy that was being distributed by the government to the farmers and how it influenced crop production in the area. All the farmers were in agreement that the amount of farm subsidy distributed was not enough. One of them went on ahead to report that: The amount of farm subsidies distributed by the government is not adequate. This is because less than a half of the farmers in the region get access to the farm inputs. However, the small

amount of farm subsidy provided by the government does influence positively the increase of crop production in the region by 30% (Agricultural Officer I, 2012). In agreement, another officer stated that: The farm subsidy provided is not enough and the government may not be able to satisfy all the needs of farmers. This is because the farm subsidy distributed by the government only acts as a demonstration kit to the farmers that using right amount of seeds and fertilizers leads to high yields. Besides, most of the farm inputs supplied gives high yields. Therefore farmers are encouraged to adapt to the inputs.

### Conclusion and Recommendations

It was also concluded that several challenges affected the subsidy programme. The challenges included but not limited to poor channel of distribution of subsidized, lack of regular soil pH and nutrients testing and the small number of farmers under the programme. Based on the challenge of limited number of the farmers who benefited from the subsidy programme, the study recommends that the government should increase capitation for the programme to bring more farmers into the programme to improve production of maize given that there is a significant increase of production under the subsidy programme.

### Acknowledgements

I am most humbled to express my feelings of thankfulness to a number of people of good will both individually and collectively for their contribution towards this writing. I wish to thank my dedicated supervisors Dr. Dan Nyantika (Ph.D.), Dr. Tom George Ekisa (Ph.D.) and Dr. Mamboleo for their invaluable professional guidance, moral support, insightful criticisms. I am particularly grateful to my lecturer Mr. Gilbert Nyakundi Okebiro for taking time to guide me through during the lectures in Geography units. I wish to appreciate my respondents including the farmers and Ministry of Agriculture staff for their commitment and time in answering the questionnaires. I wish to thank my colleagues in the master's class, Mr. Moses Berra Mwanga and Mr. Bernard Okiega Kebati for encouragement and motivation accorded to me in this project. Finally, Bishop Crowley Secondary school-Lukesi staff, for their commitment brought the whole work into the form in which it appears now. May God bless you all in a special way.

### References

1. Ayieko, M., Tschirley, D. and Mathenge, M. 2005. Fresh Fruit and Vegetable consumption patterns and supply chain systems in urban Kenya: Implications for policy and investment priorities" Egerton University Tegemeo Institute WPS 16/2005.
2. Byerlee, D., Jayne, T. and Myers, R.J. 2006. Managing food price risks and instability in a liberalizing market environment: Overview and policy options. *Food Policy*, 31(4): 275-287.
3. Crawford, Eric W., Jayne, T.S. and Valerie A. Kelly. 2006. Alternative Approaches for Promoting Fertilizer Use in Africa. Agriculture and Rural Development Discussion Paper 22, Washington D.C., The World Bank.
4. Danish International Development Agency (DANIDA), 2011. Agricultural input subsidies in sub-Saharan Africa, International Development Cooperation, Ministry of Foreign Affairs of Denmark, Evaluation Study 2011/2.
5. Denning, G., Kabambe, P., Sanchez, P., Malik, A., Flor, R., Harawa, R., *et al.*, 2009. Input subsidies to improve smallholder maize productivity in Malawi.

6. Dorward, A., Chirwa, E., Slater, R., Jayne, T., Boughton, D, *et al.*, 2008. Evaluation of the 2006/7 Agricultural Input Subsidy Programme, Malawi. Final report. Available: <https://eprints.soas.ac.uk/5130/>.
7. Droppelmann Klaus, 2009. FSP Policy Advisory Note (revised), Lusaka.
8. Druilhe, Z. and Barreiro-Hurle, J. 2012. Fertilizer subsidies in sub-Saharan Africa. ESA Working paper No. 12-04, Rome, FAO.
9. Evenson R.E. and Golin D. 2003. Assessing the Impact of the Green Revolution, 1960 to 2000. *Science*, 300:758-762.
10. FAO, 2002. The state of food insecurity in the world, 2002, p 1 [www.fao.org](http://www.fao.org).
11. FAO, IFAD (International Fund for Agricultural Development) and WFP (World Food Programme). 2015. Achieving Zero Hunger. The critical role of investment in social protection and agriculture. Rome, FAO.
12. Hazell, P., Poulton, C., Wiggins, S. and Dorward, A.R. 2007. The Future of Small Farms for Poverty Reduction and Growth. 2020 Vision Discussion Paper 42. Washington D. C., IFPRI.
13. Jacob Ricker-Gilberta, Nicole M. Masonb, Francis A. Darkoc, Solomon T. Tembod. 2013. What are the effects of input subsidy programs on maize prices? Evidence from Malawi and Zambia. *Agricultural Economics*, 44: 671–686.
14. Johnston, B.F. and Kilby, P. 1975. Agriculture and structural transformation: Economic strategies in late-developing countries. New York: Oxford University Press.
15. Khan, M.J. 2011. Agriculture Year Book 2011, new Delhi.
16. Kherallah, M., Delgado, C.L., Gabre-Madhin, E., Minot, N. and Johnson, M. 2002. Reforming Agricultural Markets in Africa. IFPRI and Johns Hopkins University Press.
17. Langyintuo, A.S. 2008. Modeling Agricultural Technology Adoption: Principles and Concepts, presented at an Econometric Training Course, 7–11 April, 2008, Birchwood hotel, Johannesburg, South Africa (CIMMYT), Harare, Zimbabwe.
18. Larson, B.A. and Frisvold, G.B. 1996. Fertilizers to support agricultural development in sub-Saharan Africa: What is needed and why. *Food Policy*, 21(6): 509–525.
19. MoA, 2004. The Status of Maize Seed Industry in Kenya: A Value Chain Analysis.
20. Morris, M., Kelly, V.A., Kopicki, R.J. and Byerlee, D. 2007. Fertilizer use in African agriculture: Lessons learned and good practice guidelines. The World Bank. FAO, The state of food insecurity in the world, 2002, p 1 [www.fao.org](http://www.fao.org).
21. NAAIAP, 2009. A call for action to increase effective farm inputs use in Kenya. Compiled by Zaweria Thuku . Ministry of agriculture, Nairobi, Kenya.

22. Nyoro, J.K. 2002. Kenya's Competitiveness in Domestic Maize Production: Implications for Food Security. Paper Presented in a Seminar at the African Study Center, University of Leiden. November 7, 2002, Leiden, Netherlands: Tegemeo Institute, Egerton University, Kenya, 2002 <http://www.ascleiden.nl/pdf/paper07112002.pdf> (accessed 1st January 2011).
23. Pixley, K. and Banziger, Marianne, 2001. Open-Pollinated Maize Varieties: A Backward Step or a Valuable Option for Farmers. In Seventh Eastern and Southern African Maize Conference. Harare Zimbabwe, 22-28 pp.
24. Sheahan, M. 2012. Department of Agricultural Economics. Michigan State University; East Lansing: 2012. Analysis of Fertilizer profitability and use in Kenya. Master's Thesis.
25. Sikobe, R. 2008. National Accelerated Agricultural Inputs Access Programme (NAAIAP) Training module. PowerPoint presentation.
26. Solem Ray, 1985. Bureau for Program and Policy Coordination David Wilcock Development Alternatives, Inc. (Barbara S.Lynch Independent Consultant).
27. Walkenhorst, Peter. 2007. Distortions to Agricultural Incentives in Nigeria.
28. World Bank. 2007. World Development Report 2008; Agriculture for Development, Washington, DC.