Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.4, No.7, 2013

Farmers' Assessment of the Government Spraying Program in Ghana

Benjamin Tetteh Anang [1*] Francis Mensah [2] Anthony Asamoah[2]
1. Dept. of Agric. & Resource Economics, University for Development Studies, Tamale, Ghana
2. Faculty of Agriculture, University for Development Studies, Tamale, Ghana
* E-mail of the corresponding author: abtben@yahoo.com

The research was self-financed by the authors.

Abstract
The study assessed the effectiveness of the Government spraying program which was introduced to eradicate cocoa pests and diseases in Ghana. One hundred and twenty (120) cocoa farmers were randomly selected from six communities in the Wassa Amenfi West District of the Western Region of Ghana and interviewed using a semi-structured questionnaire. Effectiveness of the spraying program was assessed using descriptive statistics while the Kendall's coefficient of concordance was used to analyze the constraints facing the program. The study showed that 14.2% of farmers never benefitted from the spraying program since its inception in 2001. In addition, the study found that the spraying program in the district did not follow the recommended spraying regime with 68.3% of farmers expressing dissatisfaction with the performance of the spraying personnel. Inadequate supply of chemicals and inadequate spraying personnel were the most critical constraints. Timely provision of chemicals and supervision of the spraying personnel were recommended.
Keywords: Cocoa, CODAPEC, constraints, government spraying program, pests and diseases

1. Introduction

Cocoa (Theobroma cacao) is Ghana's most important agricultural export crop and the backbone of the country's economy (Bulír, 2003; Dormon et al., 2004; Tutu, 2011).The country is currently the second leading producer of the crop after Cote d'Ivoire (Kessel, 2002). Cocoa is important to the Ghanaian economy as a major source of government revenue and household income in the cocoa growing districts of Ghana. The crop ranks second only to gold in terms of foreign exchange earnings and contributes more than half of Ghana's total revenue from agricultural export. According to ISSER (2003), cocoa constituted 63% of the foreign export earnings from the agricultural sector in 2002, compared to 25% and 12% contributed by timber and the non-traditional export sectors. It is estimated that there are about 865,000 cocoa farmers in the country and an estimated 2 million people whose employment and earnings hinge on cocoa (Gakpo, 2012). According to Asamoah and Baah (2002), the cocoa sector in Ghana employs over 800,000 smallholder farm families made up of farm owners, share croppers and their dependants. The number of cocoa farm owners is estimated at 350,000. In addition, it is estimated that smallholder farmers derive about 70 – 100% of their annual household incomes from cocoa production. According to Asamoah and Baah (2002), other stakeholders like chemical companies, input distributors and licensed cocoa buying companies (LCB's) also depend largely on cocoa for markets for their products, employment and income. The cocoa sector in Ghana is a well-structured and strategic industry which according to Laven (2007) represents an African success story.

Ghana's cocoa production rose from a modest 36.3 metric tons in 1891 to about 557,000 metric tons in 1964/65, which made the country the leading producer with a global output share of about 33% (Adjinah and Opoku 2010). Between 1960 and 1980, Ghana's cocoa production was above 500,000 tons per annum. Production however fell to an all-time low of 158,956 tons in the 1983/84 crop season which constituted 9% of global output. The decline in production in the 1980s was attributed to factors such as the 1983 drought and bushfires, pest and diseases, an over-valued foreign exchange and general economic collapse.

A major objective of stakeholders in the Ghanaian cocoa industry is to ensure sustainable increase in production at the farm level. This has led to the recognition of proper farm maintenance practices such as weeding, increased use of pesticides and fertilizers as effective measures to increase production. As the country's most important traditional crop, cocoa is considered a strategic crop and therefore receives significant government support in the agricultural sector in terms of funding and research. The Cocoa Research Institute and the Crops Research Institute both contribute significantly to cocoa research, while the Ghana Cocoa Board (Cocobod) through an international syndication system mobilizes funds for cocoa purchases.

Despite efforts to revamp cocoa production in the country, a major problem which continues to constrain the

production of the crop is the incidence of pests and diseases (Dormon et al, 2004). As indicated by Binam et al (2008) and Dzene (2010), a greater part of cocoa production is lost through diseases, pests and weeds on the farm. Cocoa diseases include cocoa necrosis virus, cocoa mottle virus, black pod rot, and swollen shoot virus (Olunloyo (n.d); Hughes and Ollennu 1994). The major insects that destroy cocoa trees in Ghana include capsids/mirids and mealy-bugs. Capsids/mirids damage the plant material by feeding on the sap of the cocoa trees while the mealy-bugs are responsible for the spreading of the cocoa swollen shoot virus. A significant reduction in cocoa production in Ghana is attributed to the cocoa swollen shoot virus disease (CSSVD) which is spread by the mealy-bug. Philips (1962) estimated the annual yield losses in cocoa production in the country at about 20,000 tones. Hale (1953) put the estimated yield losses at 120,000 tones. Poor farm maintenance practices, planting of low-yielding varieties and the incidence of pests and diseases have been attributed to the low productivity of cocoa in Ghana (Abekoe et al 2002). Hence, preventive and curative measures are necessary in the cocoa industry to achieve sustainable increase in output.

To address the problem of pests and diseases, the Government of Ghana introduced the free cocoa mass spraying program in 2001 after previous failed attempts in the 1960s and 1970s (Duncan, 2000). Reasons for the failure of the government spraying program in the 1960s and 1970s included gross inefficiency of the spraying personnel, apparent diversion and misappropriation by officials and open discrimination against farmers by the spraying personnel.

To ensure the successful implementation of the current program, the National Cocoa Disease and Pest Control (CODAPEC) committee was put in place. Spraying personnel are recruited and trained to spray farmers' fields. There is a District Task Force (DTF) at the district level and a Local Task Force (LTF) at the unit/village level. The DTF is responsible for the recruitment of spraying personnel, storage and distribution of inputs and logistics to the spraying personnel, and general supervision at the district level. The role of farmers in the program include carrying out normal cultural practices of brushing, pruning, shade management and removal of diseased pods, provision of water for the spraying personnel as well as monitoring the spraying activities on the farm to ensure proper spraying (Adjinah and Opoku, 2010)

After more than a decade of implementation, not much is known about how farmers perceive the government spraying program. The researchers' interactions with farmers as well as research findings (for example Dormon et al., 2004; Abankwah et al., 2010) however indicate problems with the implementation of the program. This research was therefore intended to fill the research gap by investigation farmers' perceptions of the government spraying program. Assessment of the effectiveness of the spraying program looked at the following: farmers' access to the program, the period of spraying, the frequency of spraying, the performance of the spraying personnel, and farmers' general perceptions of the program. Finally, the paper identified and analyzed the constraints militating against the spraying program and came out with recommendations to enhance the implementation of the program.

1.1 Objectives of the study

The main objective of the study was to assess the performance of the government spraying program in the Wassa Amenfi West district of Ghana. The study, however, had the following specific objectives.

1. To assess the effectiveness of the government spraying program in the study area
2. To identify and rank the constraints militating against the government spraying program.

2. Methodology

2.1 Study Area

The study was conducted in the Wassa Amenfi West District which is one of the major cocoa growing districts in Ghana. The district covers an estimated area of 2,354 km^2. The average annual rainfall is between 1,400mm and 1,730mm. Temperatures are generally high during most parts of the year and ranges between 24°C – 29°C. Crops grown in the district include cocoa, cocoyam, plantain, cassava, and maize.

2.2 Sampling procedure, data collection and analysis

Purposive sampling was use to select six (6) communities in the Wassa Amenfi West District for the study. The communities included Asankrangwa, Asankran-Oda, Breman, Affiena, Moseaso and Samreboi. Random sampling was used to select twenty (20) farmers from each community, giving a sample size of 120 respondents. Face-to-face interviews were conducted with farmers using a structured questionnaire. Data collected included on socio-demographic and demographic data, perceptions of farmers, periods and frequency of spraying, and constraints.

Effectiveness of the spraying program was assessed using descriptive statistics and the results presented using frequency counts, percentages and graphs. The Kendall's Coefficient of Concordance test was used to rank the constraints facing the spraying program. The Kendall's Coefficient of Concordance is a non-parametric statistical procedure used to identify a given set of constraints or problems, from the most influential to the least influential

as well as measure the degree of agreement or concordance among the respondents. The identified constraints were ranked from the most influential to the least influential using numerals, 1, 2, 3 ... n, in that order where n is positive integer. The total rank score for each constraint was computed and the constraint with the least score was ranked as the most pressing one, while the constraint with the highest score was ranked as the least pressing one. The total rank score computed was used to calculate the Kendall's Coefficient of Concordance (W), a measure of the degree of agreement between respondents in the ranking. The equation for the Kendall's coefficient is given as:

$$W = \frac{12\left[\sum T^2 - (T)^2 / n\right]}{nm^2(n^2 - 1)} \quad (1)$$

where W = Kendall's Coefficient of Concordance
T = Sum of ranks for constraints being ranked
m = Total number of respondents
n = Total number of constraints being ranked.

W ranges from 0 to 1, where 0 implies perfect disagreement and 1 implies perfect agreement. The Coefficient of Concordance (W) was tested for significance in terms of the F – distribution. The F – ratio is given by $F = [(m - 1)W/(1 - W)]$, with numerator and denominator degrees of freedom of $(n - 1) - (2/m)$ and $m - 1[(n - 1) - 2/m]$ respectively (Edwards, 1964).

2.3 Test of hypothesis

The following hypothesis was tested:

Ho: Respondents do not agree on the ranking of the constraints to government spraying program in the Wassa Amenfi West district.

The null hypothesis is rejected if the calculated F – value is greater than the tabulated F – value. Rejection of the null hypothesis implies that the respondents agree with each other on the ranking of the constraints facing the government spraying program.

3. Results and Discussions

Table 1 shows some socio-demographic characteristics of the respondents.

Table 1: Some socio-demographic characteristics of the respondents

Characteristic of farmer		Frequency	Percentage (%)
Gender:	Male	95	79.2
	Female	25	20.8
Age (years):	20 – 29	15	12.5
	30 – 39	24	20
	40 – 49	10	8.3
	50 – 59	40	33.3
	60 and above	31	25.8
Educational status	No formal education	16	13.3
	Primary education	22	18.3
	Middle School education	44	36.7
	Junior secondary school	23	19.2
	Senior secondary school	13	10.8
	Tertiary education	2	1.7
Marital status:	Single	15	12.5
	Married	93	77.5
	Divorced	6	5
	Widowed	6	5
Household size:	Less than 5	32	26.7
	5 – 9	58	48.3
	10 – 14	27	22.5
	15 – 19	2	1.7
	20 and above	1	0.8

The majority of the respondents were males (79.2%) and this could be attributed to the fact that men are household heads and traditionally control asset such as land and tree crops. Cocoa production in Ghana is generally considered a male activity even though women play major roles in the post-harvest practices and other farm management activities like weed control. The age profile of respondents shows an ageing population, with fifty nine (59) percent of respondents being 50 years and above. Majority of the farmers (86.7%) had obtained at least primary school education while 13.7% had no formal education. The respondents therefore possess minimum to adequate education which can help them to read, understand and properly adopt new technologies in cocoa production. Since farming is tedious and involves a lot of activities which require human labor, it was expected that majority of the respondents would be married and having large family sizes to assist in the farm work. The study showed that 77.5% of the respondents were married while 70.8% had household sizes between 5 and 14.

3.1 Assessing the effectiveness of the government spraying program

3.1.1 Access to the government spraying program

In determining access to the government spraying program, farmers were asked if they have ever benefitted from the program since its inception in 2001. The study showed that 85.8% had benefitted from the program while 14.2% had never benefitted from the program. Reasons given for the lack of access included the location of

some farms, particularly those situated between two communities which sometimes led to demarcation problems. Because spraying personnel were assigned to communities, some farms which shared boundaries with other communities were sometimes not covered due to boundary disputes. In addition, the long distance to some farms deterred the spraying personnel from going to spray them.

3.1.2 Assessing the frequency of spraying

According to the CODAPEC program, cocoa farms were supposed to be sprayed four times a year between July and November as recommended by the Cocoa Research Institute. The study showed that only 5% of farmers had their farms sprayed four times in the year while 46.6% had their farms sprayed only once (Figure 1). Hence the spraying program in the district is not following the recommended spraying regime. The program is not properly carried out in the district and this could affect cocoa production in the area. The finding is in support of Abankwah et al., (2010), who indicated that the government spraying program to control pest and disease in Ghanaian cocoa farms has not reached its full potential because it has not been able to fulfill its mandate of ensuring that cocoa farms are sprayed four times a year between July and November.

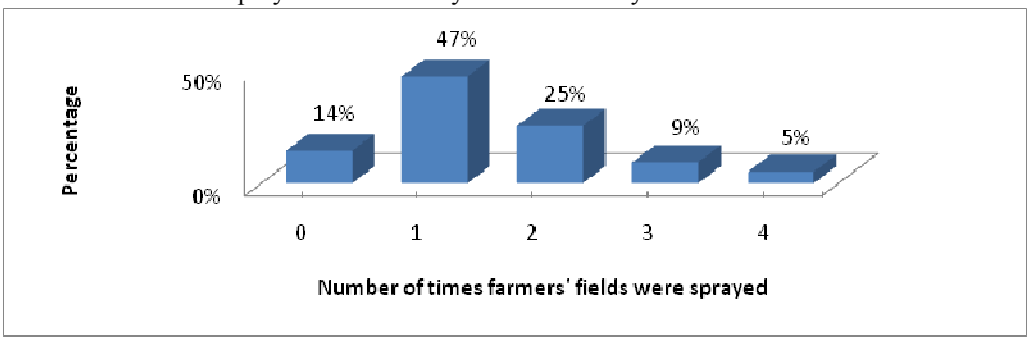

Figure 1: The frequency of spraying

3.1.3 Assessing the period of spraying

The Cocoa Research Institute (CRI) recommends that cocoa farms should be sprayed between July and November when insect and fungus infestation is high. The specific months of spraying are July, August, September and November. Majority of the farmers (77%) had their farms sprayed within the recommended time period with no farmer having his farm sprayed before the recommended period (Table 2). Twenty three (23) percent of farmers had their farms sprayed in October and December which were not part of the recommended periods for spraying. Untimely supply of chemicals delayed the beginning of spraying while inadequate spraying personnel led to the spraying extending beyond the spraying period.

Table 2: The period of spraying

Periods	Frequency	Percentage %
July*	10	7
August*	25	18
September*	30	22
October	21	16
November*	41	30
December	10	7
Total	137	100

*Recommended months for spraying

3.1.4 Farmers' assessment of the performance of the spraying personnel

The study showed that 68.3% of the farmers were dissatisfied with the performance of the spraying personnel. Farmers complained of spraying personnel doing a poor job, attributing this to poor training as well as frequent breakdown of spraying machines. Poor spraying by spraying personnel has been reported by other researchers. Dormon et al. (2004) noted that spraying personnel employed by the government to spray cocoa farms were occasionally accused by farmers of doing a poor job. Farmers complained that since the spraying personnel were paid on the basis of area covered, they tended to spray to cover as much acreage as possible instead of targeting the capsids (insects) on the canopies of the cocoa trees.

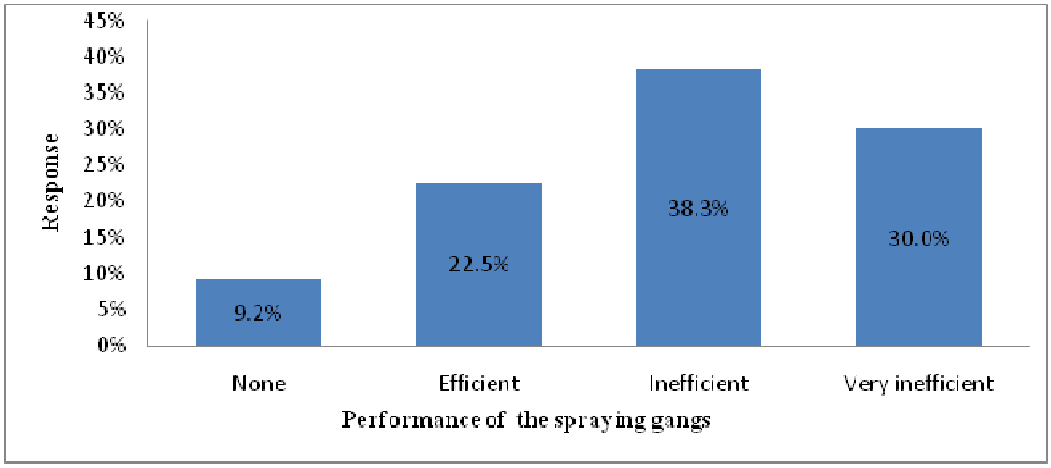

Figure 2: Farmers assessment of the performance of the spraying personnel

3.1.5 Farmers' perception about the government spraying program

The cocoa spraying program was rated very low in terms of effectiveness by the respondents as shown in Figure 3. The result shows that farmers in the district have a poor impression of the exercise. Farmers indicated that the program was beset with challenges such as failure to cover all farms, spraying is not timely and does not follow the recommended regime, and shortage of chemicals.

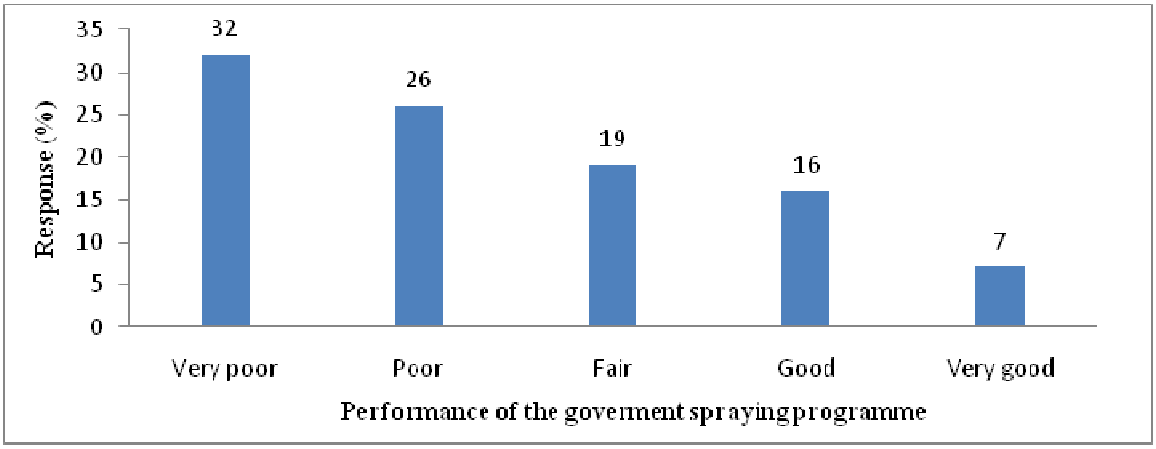

Figure 3: Farmers' assessment of the performance of the government spraying program

3.2 Analysis of constraints

Table 3 shows the constraints identified by farmers and the analysis of the constraints using the Kendall's Coefficient of Concordance.

Table 3: Identification and ranking of constraints of the mass spraying exercise

Constraints	Overall Rank	TWS	Rank score of factors						
			1	2	3	4	5	6	7
Inadequate supply of chemicals	1st	198	90	12	6	6	0	0	6
Inadequate spraying gangs	2nd	252	15	93	3	3	6	0	0
Frequent breakdown of the spraying machines	3rd	399	0	3	84	24	9	0	0
Spraying poorly done	4th	468	6	0	18	81	6	9	0
Political interference	5th	558	9	6	6	0	81	12	6
Theft of chemicals	6th	678	0	6	0	6	18	78	12
Discrimination and favoritism	7th	807	0	0	3	0	0	21	96

W = 0.72, F*cal* =306, F*tab*= 5.9 at 5% significance level, TWS = total weight score

Since the calculated F – statistic (306) is greater than the critical F – value (5.9), the null hypothesis that there

was no agreement among respondents' ranking of the constraints is rejected. The coefficient of concordance (W) showed that 72% of the respondents were in agreement with the rankings of the constraints. Insufficient supply of chemicals was identified as the most critical constraint, followed by inadequate spraying personnel. Favoritism by the spraying personnel was the least constraint.

The results are consistent with the findings of Abankwah et al (2010) who identified setbacks to the cocoa mass spraying program to include insufficient supply of chemicals, stealing of pesticides by sprayers and inadequate fuels for spraying machines. They also reported that the government spraying program to control pests and diseases has not reached its full potential because it has not been able to fulfill its mandate of ensuring that cocoa farms are sprayed four times a year between July and November.

Another problem was inadequate spraying personnel. According to the farmers' the number of spraying personnel in the area is too small compared to the size of cocoa farms in the area. As much as 74% of the farmers mentioned the need for additional spraying personnel in their communities.

Constant breakdown of spraying machines delays spraying. In some instances, farmers are given the chemicals to spray their own farms at their own cost. In addition, some farmers also reported that because the gangs were paid on the basis of area covered, they tended to spray to cover as much acreage as possible instead of targeting the capsids (insects) on the canopies. Farmers also identified theft of chemical sprays as a constraint. Discrimination and favoritism was the least constraint.

4. Conclusion

From a farmers' perspective, the government spraying program which was introduced to eradicate pests and diseases affecting cocoa production in the country has been ineffective in the study area as a result of problems facing the implementation of the program. Logistical problems, poor spraying and failure to follow the recommended spraying regime pose a big challenge to the successful implementation of the government spraying program in the district. There is therefore the need for the Government to ensure that right quantities of chemicals are made available at the right time to ensure an effective spraying regime. In addition, CODAPEC must closely monitor the work of the spraying personnel to ensure that they do a thorough job.

References

Abankwah, V., R. Aidoo and R.K. Osei, 2010. Socio-Economic Impact of Government Spraying Program on Cocoa Farmers in Ghana. J. Sustain. Dev. Afr. 12(4): 116-126.

Abekoe, M.K., D. Obeng-Ofori and I.S. Egyir (2002). Technography of Cocoa in the Forest Zone of Ghana. Unpublished Technical Report, Convergence of Sciences Project. University of Ghana, Legon, 51 pp.

Adjinah, K.O. and Opoku, I.Y. (2010). The National Cocoa Diseases and Pest Control (CODAPEC): Achievement and Challenges. Accessed on May 5, 2012. Available at http://news.myjoyonline.com/features/201004/45375.asp

Asamoah, M. and Baah, F. (2003). Improving Research-Farmer Linkages: The role of CRIG. A paper submitted at the 4th International Seminar on Cocoa-Pests and Diseases (INCOPED), Accra, Ghana, 19 – 21October 2003.

Binam, J. N., Gockowski J., and Nkamleu G. B (2008). Technical Efficiency and Productivity Potential of Cocoa Farmers in West African Countries, Dev. Econ., XLVI (3): 242-63.

Bulír, A. (2003). Can price incentive to smuggle explain the contraction of the cocoa supply in Ghana? J. Afr. Econ., 11(3): 413-439.

Dormon, E.N.A., Van Huis, A., Leeuwis, C., Obeng- Ofori, D. and Sakyi-Dawson, O. (2004). Causes of low productivity of cocoa in Ghana: Farmers' perspectives and insights from research and the socio-political establishment. NJAS Wageningen J. Life Sci., 52(3-4): 237-259.

Duncan, E. (2000). Let's Maintain Quality Standards. Daily Graphic, No.147940, 22 June 2006.

Dzene, R. (2010). What Drives Efficiency on the Ghanaian Cocoa Farm? Working Paper, Ghana Institute of Management and Public Administration, Accra, Ghana.

Edwards, A. L. (1964). Statistical Methods for the Behavioral Science. Holt, Rmehart and Winston, New York. pp. 402, 410.

Gakpo, J. O. (2012). Nurturing a youthful generation of cocoa farmers. Feature Article. Modern Ghana. 30 May 2012. Accessed on 28 September 2012. Available at http://www.modernghana.com/news/398735/1/nurturing-a-youthful-generation-of-cocoa-farmers.html

Hale, S.L. (1953). "World Production and Consumption – 1951 to 1953." Report and Proceedings of the 1953 London Cocoa Conference, 3-11.

Hughes J. d'A. and Ollennu L. A. A. (1994). Mild Strain Protection of Cocoa in Ghana Against Cocoa Swollen Shoot Virus: A Review. Plant Pathology 43 (3): 442–457, June 1994. DOI: 10.1111/j.1365-3059.1994.tb01578.x

Institute of Statistical, Social and Economic Research (ISSER) (2003). State of the Ghanaian Economy. Institute

of Statistical, Social and Economic Research (ISSER), University of Ghana, Legon, Accra, Ghana.
Kessel, I.V. (2002). Merchant, Missionaries and Migrants – 1st Edition. Royal Tropical Institute, Amsterdam.
Laven, A. (2007). Marketing reforms in Ghana's cocoa sector. Partial liberalization, partial benefits? ODI Background Notes 4, December 2007. Amsterdam Research Institute Metropolitan and International Development Studies.
Olunloyo, O.A. (n.d.). A General Overview of Cocoa Viruses in West Africa. Cocoa Research Institute of Nigeria, Ibadan, Nigeria. Accessed on 14 December 2012. Available at http://old.iita.org/cms/details/virology/pdf_files/137-157.pdf
Phillips, M.P. (1962). "Production in the Eastern Region of Ghana." Report and Proceedings of the 1961 London Cocoa Conference, 178-9.
Tutu, K. (2011). Trade for Sustainable Development: The Story of Cocoa, Gold and Timber Exports in Ghana. Roundtable discussion organized by the Institute of Economic Affairs (IEA), Accra, 2011. In: Bus & Financ Times. Friday February 2011; 1209: 1 – 3