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## Tomato Production Constraints at Bontanga Irrigation Project in the Northern Region of Ghana

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**Abstract:** Tomato production in the Bontanga irrigation area has reduced drastically. Thus, a study was conducted to identify the problems. Structured and unstructured questionnaires were administered to 50 farmers randomly selected from about 90 farmers in the study area for two years. The results showed that 60% of the farmers were illiterates and 20% had formal education. Over 70% of the farmers obtained their seed from markets and unregistered agro-stores and the remaining use their reserved seeds. Most of the farmers practice continuous sole cropping and very few crop rotations. The farmers also indicated lack of credit facilities as the major bane of tomato production. About 90% of the farmers complained of salinity, water logging, soil erosion and degradation, sedimentation, build up of pests and diseases as a result of irrigation related problems. Formation of farmers cooperatives or group will help solve or minimize the constraints of dwindling tomato production in this area.

**Key words:** Abiotic, biotic, farmers participation, farming system, resources, solutions

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### INTRODUCTION

Tomato, *Lycopersicon esculentum* Mill is a popular vegetable with high per capita consumption in Ghana as it is used in almost all Ghanaian homes. It is very nutritious and major source of vitamins A, C and riboflavin as well as carbohydrate, protein, calcium, carotene in our diets (Purseglove, 1979; Bull, 1989). Tomato production is a source of employment and income to both rural and urban dwellers. It contributes significantly to the economic growth of Ghana and source of foreign exchange. In the year 2003; 4,368 metric tonnes of tomatoes were exported, accruing a foreign exchange of \$427,000 to the country (Rowell, 1994; Franzoi, 1996; FAO, 2005).

In spite of economic importance of tomato to the economy of Ghana, its production currently has been declining and tomato production within Bontanga Irrigation Project in the Northern Region of the country is no exception. Farmers in this area depend on this crop for their livelihood. However, due to the drastic decline in yield, farmers have shifted into production of other vegetables such as onion and okra. Consequently, both the income levels of farmers and over all foreign exchange of the country are on the decline. For instance, tomato production in Ghana decreased from 4,368 metric tones in year 2003 to just 607 metric tones in year 2004. The corresponding foreign exchange had also dwindled from \$427,000 to \$56,000 (MOFA, 2005).

It is therefore, important to investigate the problems associated with declining tomato production at this irrigation project site and proffer solutions using farmers' participatory approach in order to save and boost the tomato industry.

### MATERIALS AND METHODS

The study was carried out at Bontanga Irrigation Project in the Tolon-Kumbungu District of the Northern Region of Ghana. The region is located in the Guinea Savanna vegetation with unimodal rainfall pattern. The region lies between latitudes 9° 15 and 9° 32 N and longitudes 0° 45 E and 0° 93 W. It is the main tomato producing area using irrigation at off season and rain fed during normal cropping season. Fifty local farmers collaborated with us for this research. Fifty farmers from the area were randomly selected and interviewed. The interviews were conducted in two languages; Dagbani (local dialect) and English based on the educational background of the respondent. The local language was used to translate questions to respondents who were illiterates. This was done with assistance from an Agricultural Extension Agent (AEA) in the area. Data were collected from September to December for two cropping seasons.

Descriptive survey was used for the study and was conducted through personal interviews and use of questionnaire. Each questionnaire had two parts

(personal data and production constraints) a total of 41 questions were asked. The questionnaire was constructed in both structured and unstructured forms. With the structured forms, all the possible answers were provided on the questions. This helped to minimize ambiguity. On the other hand, no possible answers were provided for the unstructured questions and respondents provided their own answers from their own perspectives. All the 50 questionnaires administered were received.

Statistical Package for Social Sciences (SPSS, 1999) was used in the analysis of the data obtained from the participating farmers. Two year average of the results was expressed in frequency distributions and percentages to establish the characteristics and responses of the farmers.

**RESULTS AND DISCUSSION**

Table 1 shows the age distribution of respondents in the study area, 56% of the farmers are between the ages of 30 and 39 years old. This was followed by farmers within the age group of 40-49 years representing 28% of the farmers. Twelve and 4% of the farmers are within the age distribution of 10 to 12 years and 20-29 years, respectively. Thus, majority of the farmers are in their energetic and productive years, this indicates that tomato production in this area should be more promising with the potential of expanding. The education levels of the farmers are low (Table 1). This high illiteracy rate might have resulted in their inability to adopt improved farming practices leading to the use of wrong dosages and unapproved chemicals, the use of unimproved seeds, wrong application rates, etc. This confirmed earlier report of Bull (1989). Majority of the farmers (80%) practice continuous cropping, 72% practice sole cropping, 20% practice crop rotation and 28% mixed cropping. The practice of continuous monoculture increases the possibility and severity of pests and diseases epidemics (Agrios, 1988; Awwad and Hill, 1999) thus, leading to yield reduction.

Most of the farmers (72%) apply chemical fertilizers, 12% apply organic fertilizers only 16% apply both

chemical and organic fertilizers (Table 2). Sixty eight percent of the farmers apply the fertilizers twice in a growing season, 24% apply more than twice, 4% apply once in a month and another 4% apply once in a growing season. Excessive or inadequate application of nitrogen fertilizers by the farmers especially ammonium sulphate has residual acidifying effect on the soil and may result in low yield. Increase in soil acidity will increase the severity of diseases, reduce the availability of nutrients and activity of soil microorganisms (Agrios, 1988; Rowell, 1994; Franzoi, 1996). Most of the farmers use chemical pest management method and none uses botanicals and farmers apply pesticides once every two weeks. Excessive and many regime of chemical (synthetic) pesticide application can lead to pests developing resistance as well as elimination of natural enemies and cause damage to the crop (Pementel, 1981; Agrios, 1988; Dent, 1991). Most of the farmers use family labour, 36% use casual labour and none use permanent labour. Although majority of the farmers use family labour while only a few employ casual labourers, they become scarce during periods of land preparation and harvesting resulting in late planting and harvesting of tomato, thus, leading to poor yields and rapid deterioration of the fruit.

Resource constraint and yield of tomato under irrigation in northern region of Ghana are presented in Table 3; majority of the farmers obtained their seeds from local markets, followed by Agro-stores and those saved from their farms. Most of the agro-stores are not government registered and facilities for pure seed processing are lacking or inadequate. Seeds obtained from open markets and farmers' farm are most likely mixed and infested with diseases. Sixty percent of the farmers finance their farming from personal savings whereas, 20% each obtain loan from bank, or friends and relatives. The inability of the farmers to secure loans from bank and other financial institutions could be due to lack of collateral security. As a result they may not be able to buy improved planting materials and other equipments necessary to ensure higher crop yield. Fruit yield of between 2800 and 5000 kg ha<sup>-1</sup> obtain by the farmers

Table 1: Necessary information on farmers sampled

Age group year	Frequency	Educational level	Frequency	Farming system	Frequency
10-19	6 (12)*	Illiterates	30 (60)	Mixed cropping	14 (28)
20-29	2 (4)	Non-formal	4 (8)	Sole cropping	36 (72)
30-39	28 (56)	Sec. School	10 (20)	Cont. cropping	40 (80)
40-49	14 (28)	Dipl./Graduate	6 (12)	Crop rotation	10 (20)
Total	50 (100)	Total	50 (100)	-	-

\* Figures in parenthesis are percentage of frequency

Table 2: Farmers' participatory farm operation of irrigated tomato at northern region of Ghana

Type of fertilizer	Frequency	Freq. of fertilization	Frequency	Type of pesticide	Frequency	Type of labour	Frequency
Chemical	36 (72)*	Once a month	2 (4)	Actellic	32 (84.2)	Casual	18 (36)
Organic	6 (12)	Once per growing season	2 (4)	Karate	4 (10.5)	Family	32 (64)
Both	8 (16)	Twice per season	34 (68)	Dusban	2 (5.3)	Permanent	0 (0)
No application	0 (0)	More than twice	12 (24)	Botanicals	0 (0)	-	-
Total	50 (100)	Total	50 (100)	Total	38	Total	50 (100)

\* Figures in parenthesis are percentage of frequency

**Table 3: Resources constraint and yield of irrigated tomato at northern region of Ghana**

Source of seed	Frequency	Source of capital	Frequency	Yield range (kg ha <sup>-1</sup> )	Frequency
Own farm	6 (12)*	Own savings	30 (60)	3800-5000	23 (46)
Local market	36 (72)	Relatives/Friends	10 (20)	2800-3800	23 (46)
Agro-stores	8 (16)	Bank loan	10 (20)	1300-2500	4 (8)
Totals	50 (100)	Total	50 (100)	Total	50 (100)

\* Figures in parenthesis are percentage of frequency

**Table 4: Biotic and abiotic constraint of irrigated tomato in northern region of Ghana**

Disease	Frequency	Pest	Frequency	Irrigation	Frequency
Early blight	3 (6)*	Nematodes	31 (62)	Salinity	32 (64)
Late blight	2 (4)	Aphids	8 (16)	Water logging	21 (42)
Damping-off	20 (40)	Whitefly	5 (10)	Erosion and sedimentation	15 (30)
Wilt	34 (68)	Caterpillar	16 (32)	Destruction of soil structure	22 (44)
Fruit rot	11 (22)	-	-	-	-

\* Figures in parenthesis are percentage of frequency

indicates a substantial yield loss at the Bontanga irrigation and therefore reveals serious problems at the Irrigation Project site. Sinnadurai (1992) observed that with good soil management and irrigation yield of 33,000-38,000 kg ha<sup>-1</sup> could be obtained in the Northern Region of Ghana.

Table 4 revealed biotic and abiotic constraints militating against irrigated tomato production in northern region of Ghana. Tomato wilt and damping off are the major diseases accounting for poor tomato production, then followed by early blight and late blight. Nematodes, caterpillar aphids and whitefly (62, 32, 16 and 10%, respectively) are the major pest problems of irrigated tomato. Problems of salinity, water logging, erosion, sedimentation and destruction of soil structure and texture are some of the major abiotic constraint at the irrigation site that contributed to poor performance of tomato. Excessive and poor irrigation water management are the chief cause of salt build up leading to salinity. Water logging, erosion and sedimentation and ultimately destruction of soil structure and texture occur due to lack of soil conservation practices by farmers. The soil structure destruction could also be due to continuous tilling of the land due to continuous cropping (Michael, 1978; Villarreal, 1998).

In conclusion, Bontanga irrigation project is faced with the following problems; about four percent of the farmers' populations are in their most vigorous and productive age group, large numbers of sampled farmers are illiterates; they practice continuous and sole cropping. There was heavy dependence on the use of chemical fertilizers and pesticides, the farmers use family and casual labours for their farm operations. The farmers resource constraints include; sources of pure seeds, use of personal savings with little or no assistance from friends, relatives and financial institution for farm operations. The major biotic problems were wilt, damping off, nematodes and caterpillar, abiotic stresses identified were closely related to irrigation managements; salinity, destruction of soil structure and texture, water logging

and soil erosion. However, these constraints can be overcome or minimize by the formation of farmers group or cooperatives to serve as a common force and pressure group to gain access to training, use of new agricultural packages, equipments, credit facilities, etc.

## REFERENCES

- Agrios, N.A., 1988. Plant Pathology. 3rd Edn. Academic Press, USA., pp: 803.
- Awwad, A. and M. Hill, 1999. Pests and diseases as influenced by cultural practices. *J. Agron. Crop Sci.*, 15: 36-44.
- Bull, D., 1989. A Growing Problem: Pesticide and the Third World Poor Farmers. Oxford Press, pp: 207.
- Dent, D., 1991. Insect Pest Management Strategies. CAB International, Wallingford, UK., pp: 104.
- FAO., 2005. Food and Agricultural Organisation Statistics Book on National Crop Production. Rome, Italy.
- Franzoi, S., 1996. Social Psychology. Oxford Press, pp: 305.
- Michael, A.M., 1978. Irrigation Theory and Practice. Oxford Publishers, New York USA., pp: 689-93.
- MOFA, 2005. Facts and Figures. Statistics, Research and Information Directorate. Ministry of Food and Agriculture, Accra, Ghana.
- Pementel, D., 1981. Handbook of Pest Management in Agriculture. CRC Press, Boca Raton, Florida, USA.
- Purseglove, K.O., 1979. Tropical Crops Dicotyledons. Longmans, London, pp: 199-237.
- Rowell, D.L., 1994. Soil Science Method and Application. Longman Publishers, Reading, pp: 303-325.
- Sinnadurai, 1992. Vegetable cultivation. Asempa Publication, Accra, Ghana, pp: 208.
- SPSS., 1999. Statistical Package for Social Science for Windows, Release 10, Standard Version 10.0.1.299. SPSS Inc.
- Villarreal, R.L., 1980. Tomato in the Tropics. Westview Press, Boulder, Colorado, pp: 174.