Farmers Perceptions of "Danzazzalau": Disease Affecting Onions *(Allium cepa* L.*)* in Kebbi State, Northwestern Nigeria

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Abstract

A recurrent constraint to sustained production of onions in Kebbi State, northwestern Nigeria, has discouraged production by farmers. A study was conducted between June and July of 2015 in six Local Government Areas (L.G.As) of Kebbi State, namely Birnin Kebbi, Aliero, Jega, Maiyama, Shanga and Yauri to appraise perception of farmers on the occurrence and extent of devastation of the disease colloquially called "Danzazzalau" in Hausa Language. Structured questionnaires were administered to farmers at each of the seven communities visited per L.G.A. Responses derived from the Statistical Programme for Social Science (SPSS) package show that above 50% of the respondents from Aliero, Shanga, Yauri and Maiyama recalled a disease with similar symptoms that occurred within the last 10 years. According to 74.4% of respondents, initial symptoms were noticed early on 4 to 6 week old transplants. The disease is wide spread in Kebbi State with above 60% farmers from Aliero, Jega, Maiyama, Shanga and Yauri responded to have experienced ≥ 90% loss of crop. With infected stands, 47.10% of the farmers uproot affected stands 18.50% reduce frequency of watering while 14.3%, spray synthetic pesticides as management practices for the disease. The common symptoms described by the farmers for "Danzazzalau" include sudden leaf curl with dried leaf tip, which is similar to the symptoms of basal rot of onion.

Keywords: Kebbi State, "Danzazzalau", perception, disease, onion, farmers

Introduction

Onion, (*Allium cepa* L.) is a highly valued vegetable crop used to spice many dishes. The crop is used either as matured bulb or green vegetable, when harvested early (Anyanwu, 2003). It is second to tomatoes among other vegetables in use as cooking condiment (Hussani *et al.,* 2000). FAOSTAT (2013) estimated global production at 73 x 10^6 metric tons harvested from 3.6 million hectares as in 2008 but production had declined to 66,829, 917 metric tons in 2013. Currently, Nigeria is ranked 25th among producing countries of the world but 4th highest producer in Africa (FAOSTART 2013). Amans (1996) and Inuwa (2001) noted that onion is cultivated principally in the semi-arid regions of Nigeria, which comprises the northern States of Kebbi, Kano, Sokoto, Borno, Bauchi, Jigawa, Katsina and Zamfara. Worldwide, onion production is limited by many biotic factors including bacterial, viral, parasitic flowering plants, nematodes and fungi. Emechebe *et al.* (1980) showed major diseases reported from Northern Nigeria the purple blotch (Alternaria porri), black mold diseases (Aspergillus niger), neck and bulb rot (Botrytis alli), Onion twister (Colletotrichum cingulata), downy mildew (Peronospora destructiver), pink rot (Pyrenochaeta terrestris) and the bulb rot (Fusarium oxysporium) as very important.

A disease referred to as "Danzzazalau" was first reported at Aliero and Maiyama Local Government Areas (L.G.As) by Kebbi Agricultural and Rural Development Authority (KARDA) to the Institute for Agricultural Research (IAR) in 2009. By 2015 Cropping Scheme/Research Extension and Famers

Input Linkage System (REFILS) meeting, the increased devastation and spread of the disease was reported in four L.G.As: Maiyama, Aliero, Jega and Yauri by the (KARDA) staff representative. The characteristic symptoms of the disease include drying of leaves beginning from the tip, abnormal protrusion and curling of the stalk from which they describe and name the disease "Danzazzalau" in Hausa language, which literally means "Protrusion". The purpose of this study was to assess farmers' knowledge, perception and management of "Danzzazalau" disease on onions in Kebbi State.

Materials and Methods

Structured questionnaires were administered to elicit information on occurrence and strategies used by farmers to manage the "Danzzazalau" disease in Kebbi State. Six Local Government Areas (L.G.As) namely Birnin Kebbi, Aliero, Jega, Maiyama, Sanga and Yaure were selected for the interaction. Specific locations of visited farm communities are presented in Fig. 1. Sample size of administration totaled 168 respondents in four farm communities per L.G.A were visited. At each farm community, five onion cultivated fields were visited during the interaction and samples of seed, soil, diseased and healthy (symptomless) plants were collected. The interactions and visits took place between June and July 2015 while individual interactions for administration of the questions took approximately 45 minutes per respondent. The local dialect, Hausa, was used for communication through a guide and assistance provided by the Kebbi State Agricultural Development Project (KADP). Farmers' responses were coded and subjected to analysis using the Statistical Programme for Social Science (SPSS) (Version 11.0). Results were summarized in descriptive statistics.

Results and Discusion

Average farmers' age was 49.4 years, with 52% of respondents within the 50 years and above age bracket (Fig. 1). Males evidently dominated the strenuous cultivation aspect of producing the onion crop. This is attributed to cultural and religious background of the visited communities within the State. Unlike the subtler services done in onion cultivation such as seed priming, seed threshing, sorting, and marketing which are the reserve of the female gender in the State, the physical/energy expending aspects are carried out by the males (Taibat *et al.,* 2014). Simonyan *et al.* (2011) reported that in most parts of middle and southern Nigeria, the females have ownership of the farms and they actually engage in most farm activities especially where the cost of hiring labour and capital workers is prohibitive.

Results on age groups shows that onion cultivation is done by adults who through experience know instinctively how to handle and nurture the delicate crop. David *et al.,*

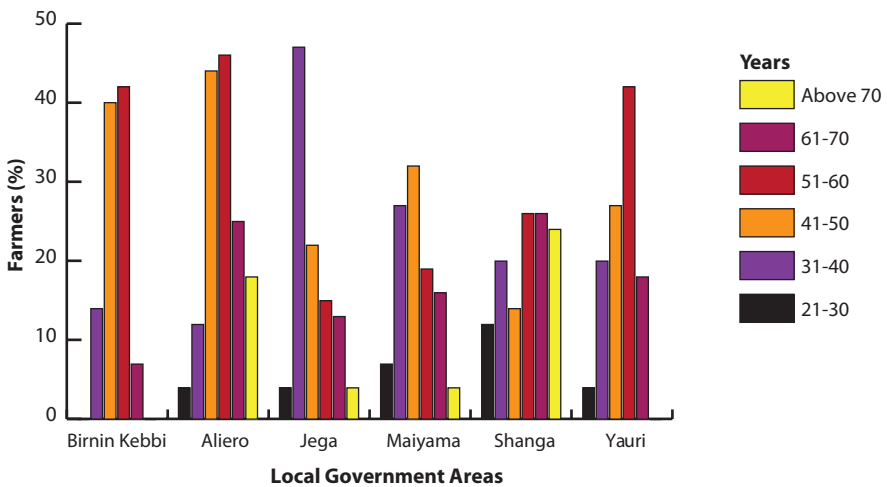

Figure 1: Age of interviewed farmers on "Danzzazalau" in L.G.A of Kebbi State

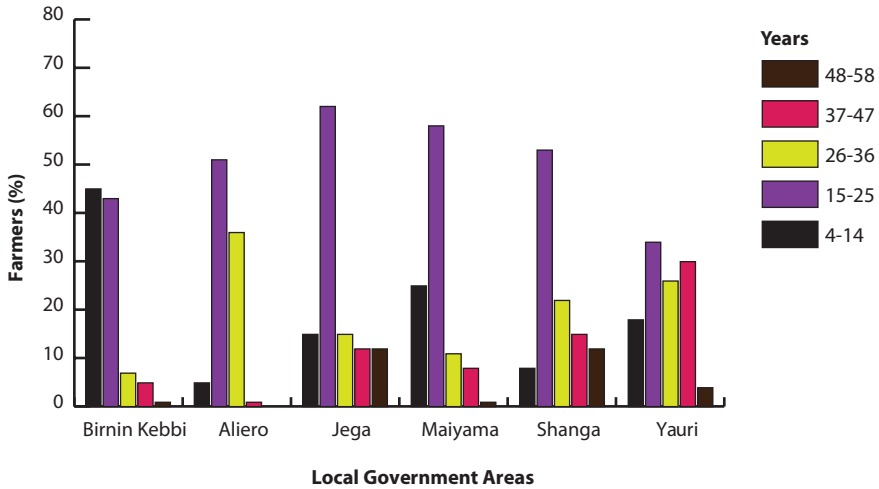

Figure 2: Farmers experience in onion cultivation in L.G.A of Kebbi State

(2009) reported that at the ages of between 15 and 64 years somebody has the energy to carry out productive ventures. Most of the farmers 61, 58, 51 and 34% in L.G.As such as Aliero, Maiyama, Jega, Shanga and Yauri have had experience in cultivating onion on the field 15 to 25 years. 30 years in onion farming within same area. All the responding farmers in Birnin Kebbi, Aliero, Jega and Maiyama indicated that they do cultivate onion as a dry season crop, while 96 and 64% farmers in Yauri and Shanga cultivate in both seasons (Fig. 3).

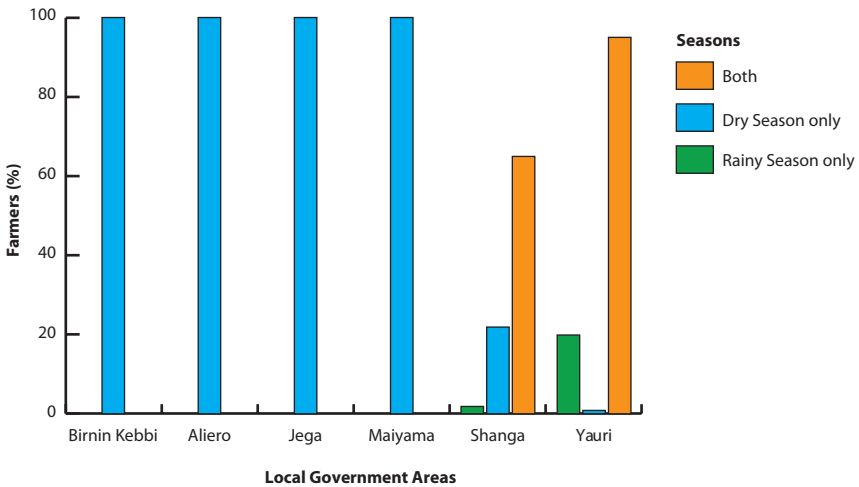

Figure 3: Seasons of onion cultivation in L.G.A of Kebbi State

Although the discussion with farmers did not seek information regarding the literacy and competence, hands on experience through repeatedly gained through cultivating same crop for 15-25 years would show knowledge on the necessary husbanding of the crop. Taibet *et al.,* (2014). As well as Ibrahim and Adamu (2008) reported this same range of experience, 21 to Farmers mostly cultivate the crop during the dry season (between September and April) which as reported by Taiwo and Ayanwale (2014) was successful in Kebbi State due to availability of facility for supplementary irrigation. The high incidence of pest and diseases prevalent under hot humid condition of the rainy season, restricts the cultivation of onion to the dry season in most

locations within the Sudan Savanna ecological zone Simonyan *et al.* (2011). Dogondaji *et al.,* (2005) asserted that production of crops under rain- fed conditions is very low, with yields of rain-fed rice and cowpeas at about 0.5 t/ha which under fadama conditions increases to between one and two tonnes/ha for rice, 10 to 15 tonnes for onion, and 5 tonnes/ha for tomatoes. As a result, net farm incomes would increase from 35,000 Naira under rain fed conditions to at least 80,000 Naira, which encourages most farmers in Kebbi State to practice irrigation farming. Also Anyanwu (2003) reported that greater part of onion production in Nigeria is undertaken in northern part of the country specifically Kaduna, Kano, Jigawa, Katsina, Sokoto, Plateau, Kebbi and Bauchi States during the dry season.

Majority farmers (54%), produce onions for dual purposes (bulb and seed) compared with 39 % who cultivate for bulb production only, while 2.4 % grow onions for other purposes. (Fig. 4). Most of the farmers produce onion for dual purposes (bulb and seed), with only a few involved in seed production only. According to Khokhar (2014), seed production is a vital part in onion cultivation and is a highly specialized business requiring some intrinsic knowledge. Most farmers (above 50%) from Aliero, Shanga, Yauri and Maiyama recalled experiencing the "Danzzazalau" over 10 years on their onion farms (Fig. 5).

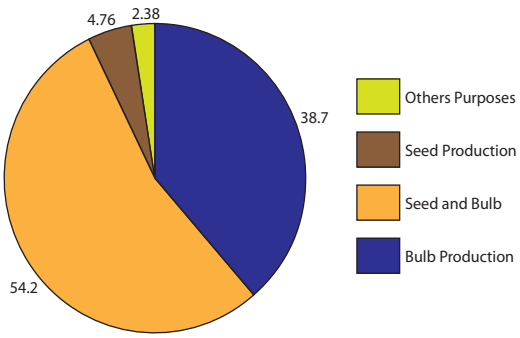

Figure 4: Purpose for onion cultivation in L.G.A of Kebbi State

The farmers from all the locations (above 50%) indicated that they do not treat seeds prior to sowing on nursery beds, while 29% and 18% from Shanga, Jega and Birnin Kebbi respectively indicated the use of seed dressing chemicals such as Apron Star and Dress Force before sowing (Fig. 6). Apparently, most of the respondents do not treat their seeds with fungicides before sowing. This implies that these seedlings are predisposed to seed-borne diseases. Lesly *et al.* (2002) found that onion farmers who did not treat seeds and sterilize nursery soil before sowing encountered diseases from the nursery stage while those who treated seeds before sowing and sterilized the soil by burning straw or husk on the nursery bed before sowing had minimum disease infection.

Majority of the respondents (above 60%) indicated first observation of "Danzazzalau" symptoms after transplanting the seedlings into fields compared with 29 and 39% of farmers from Aliero and Maiyama who observed the

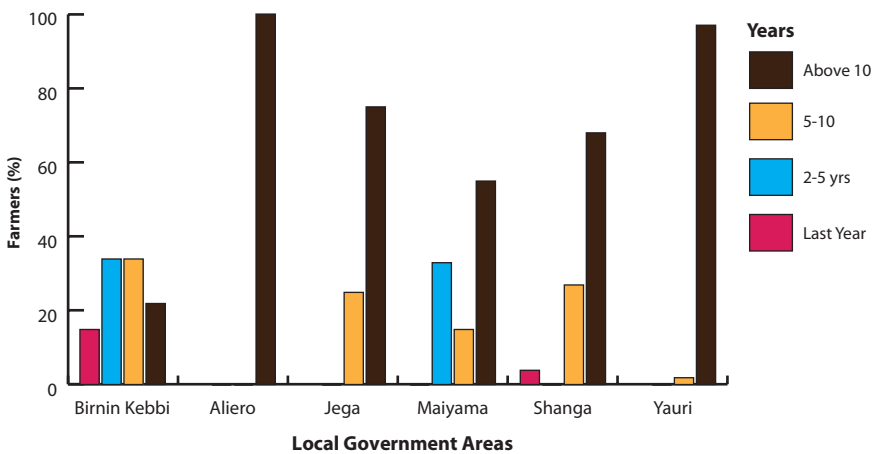

Figure 5: Duration of "Danzzazalau" occurrence L.G.A of Kebbi State

symptoms when bulbs are formed (Fig. 7). With 70% farmers recalling occurrence of the disease for about 10 years, the crop losses due to the disease confirms findings by Taiwo and Ayanwale (2014) that diseases are the major factors responsible for decline in onion production in Kebbi State.

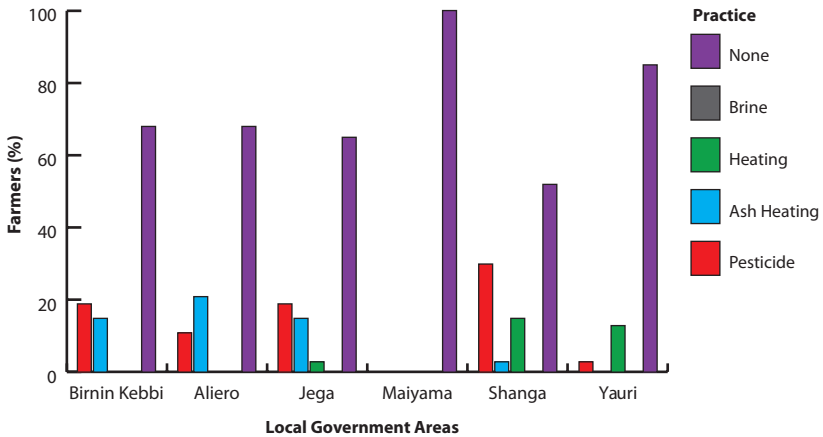

Figure 6: Pre-sowing management practices on onions in Kebbi State

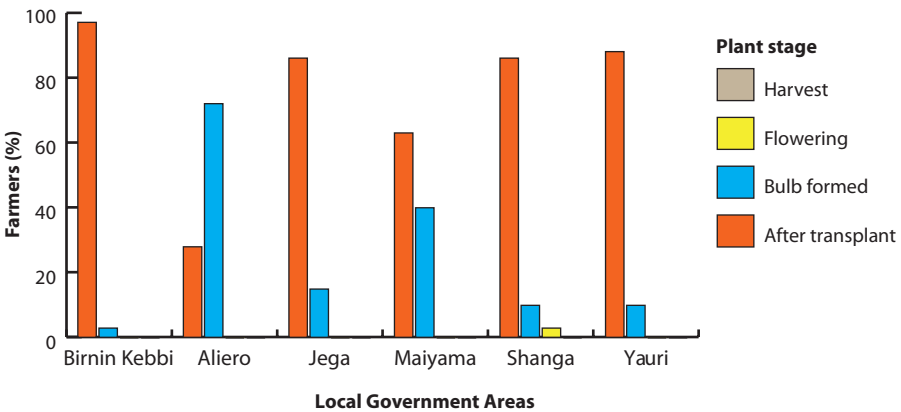

Figure 7: Stages of first symptom observation by farmers in Kebbi State

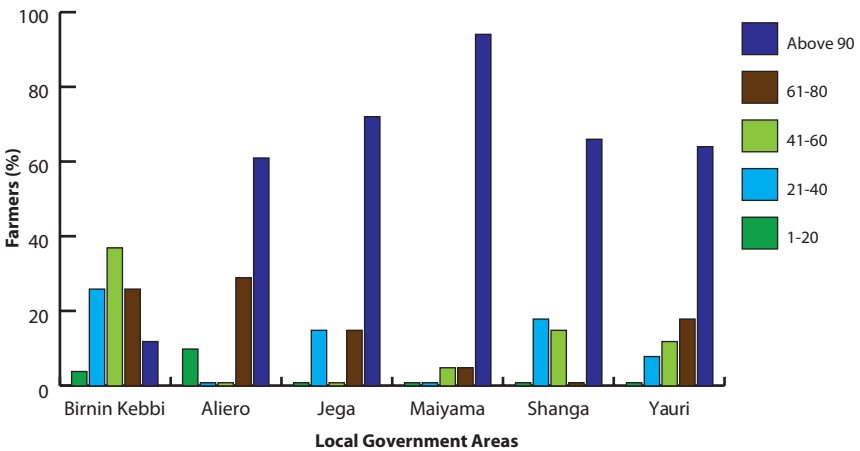

Figure 8: Yield loss due to "Danzzazalau" attack in Kebbi State

Characteristic symptoms of the disease noted and described by the farmers include plant wilt beginning from the tip, followed by an abnormal protrusion and curling of the central main leaf from which the appellation "Danzazzalau" which in Hausa language literally means "Protrusion" was coined.

With respect to loss incurred due to the disease, above 60% farmers from Aliero, Jega, Maiyama, Shanga and Yauri responded having experienced over 90% yield loss (Fig. 8). Response on initiatives taken to address an infected crop indicated that 47% rogued, 18.5 % reduced irrigation frequencies and about, 14% increased the rates of pesticide application or regimes (Fig. 9). These data define the relative importance of the crop in the socio-economic program of the respondents. The farmer is ready to commit further finances to keep the crop going by transplanting fresh seedling, invest more on irrigation and pesticide issues looking for solution.

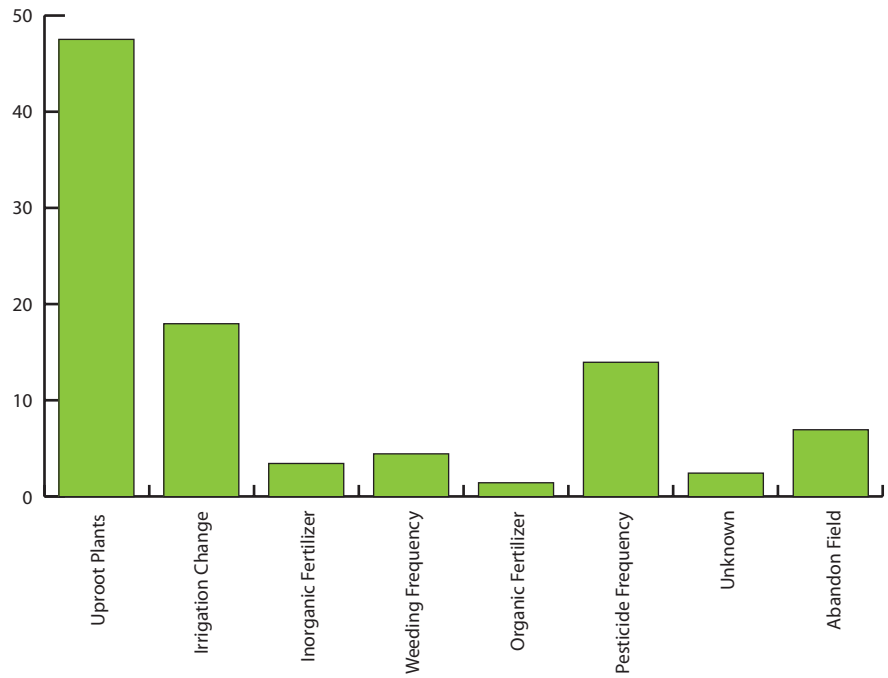

Figure 9: Management Practices in Onion Farms Applied by Farmers

Conclusion

The disease occurs in the six Local Government Areas in Kebbi State of Nigeria. This disease poses a serious threat to the production and biodiversity of this important vegetable crop. Most farmers uproot affected stands, reduce irrigation frquency and apply pesticides as management pracices. Urgent interventions are necessary to halt this emerging epidemic in Kebbi State.

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References

Amans, E.B. (1996). Effect of plant spacing and nitrogen rates on early growth and late sown dry season onion (Allium cepa L.) in Sudan savanna of Nigeria. PhD thesis Ahmadu Bello University, Zaria.

Anyanwu, B.O. (2003). Agricultural Science for Schools and Colleges. Africa First Publishers, Onitsha, Nigeria. 876-892 pp.

Barzegar, M.; Rajabi, A., Hassandokht, M. R. and Jabbari, A. (2008). Chemical composition of different cultivars of onion (Allium cepa L.) produces in Iran. Horticulture, and Environmental Biotechnology, 49(2):121-127.

David, H.D.S., Abdulrahman, R.M., Sani, S., Kushawa and Nasiru, M. (2009). Resource use efficiency in irrigated crop production by fadama users in Bauchi State, Nigeria. Implication for food security and poverty alleviation. Proceedings of the 23rd annual conference of Farm Management of Nigeria, Faculty of Agriculture, UsmanuDanfodiyo University, Sokoto, Nigeria. 14th-17th December.

Dogondaji, S.D., Baba, K.M., Muhammad, I. and Magaji, M.D, (2005): Evaluation of onion storage losses and implication for food security in Sokoto Metropolis. Bulletin of Science Association of Nigeria. 26: 10 – 14

Emechebe, A.M.; Erinle, I.D., Bos, W.S., Tyagi, P.D., Surdaram, N.V., Manzo S. K., Ebenebe, A.C. and Subbarayudu, S. (1980). A check-list of diseases of crops in the savanna and semi-arid areas of Nigeria. Institute of Agricultural research (IAR) Samaru, Zaria. Nigeria. 6pp.

FAOSTAT (2013). FAOSTAT Database Results. http://www.faostat.org.

Hussaini, M.A., Amans, E.B. and Ramalan, A.A. (2000). Yield, bulb size distribution and storability of onion (Allium cepa L.) under different levels of nitrogen fertilization and irrigation regime, Tropical Agriculture, 77(3): 145 – 152.

Ibrahim, N.D. and Adamu, T. (2008). Incidence of Thripstabacion onion (Allium cepa L.) and their control in Sokoto and Kebbi States, Nigeria. Nigerian Journal of Basic and Applied Sciences,16 (2): 221 – 226.

Inuwa, B.D. (2001). A study of issues arising from the production of garlic (Allium sativum) in Nigeria. Paper presented at the training workshop on improving and accelerated garlic production for local and export needs in Nigeria. Food Crops Production Technology Transfer Station (FDA), Dan Hassan, Kano. 16p.

Khokhar, K.M. (2014) Flowering and Seed Development in Onion. A Review. Open Access Library Journal, 1: e1049.http://dx.doi.org/10.4236/oalib.1101049.

Lesly, W.D., Malaviarachichi, M.P.K., Yawardena, W.S.N., Kumarawathne M. J. (2002) Farmer management practices on the productivity of Bigonion cultivation in the dry zone of Sri Lanka. Annals of Sri Lanka, (4):385-382.

Mahanthesh, B., Ravi P., Saijan, M., Harshavardhan, M., Vishnuvardhana, Janardhan, G. (2008). Evaluation of different onion (Allium cepa L.) genotypes for yield and processing quality parameters in kharif season under irrigated condition. The Asian Journal of Horticulture, 3(1):5-9.

Nwadukwe, P.O. and Chude, V.O. (1995).Effects of nitrogen and phosphorous fertilization on seed crop of onion (Allium cepaL.) in a semi arid tropical soil. Tropical Agriculture (Trinidad), 72(3):216-219.

Simonyan J.B., Umoren, B.D. and Okoye, B.C. (2011). Gender differentials in technical efficiency among maize farmers in EssienUdim Local Government Area, Nigeria. International Journal of Economics and Management Sciences, 1(2):17–23.

Taibat, A.M., Ishaq, D.S., Damana, B.S. and Musa, D.B. (2014). Constraints to Rural Women's Participation in International Fund for Agricultural Development (IFAD)/ Community Based Agricultural and Rural Development Programme (CBARDP) in Kebbi State, Nigeria. International Journal of Scientific and Research Publications, 4(12):3.

Taiwo, A. and Ayanwale, A.B. (2014). Risk and risk management strategies in onion production in Kebbi State of Nigeria. Journal of Social Sciences, 10(1): 1-8.

Appendix

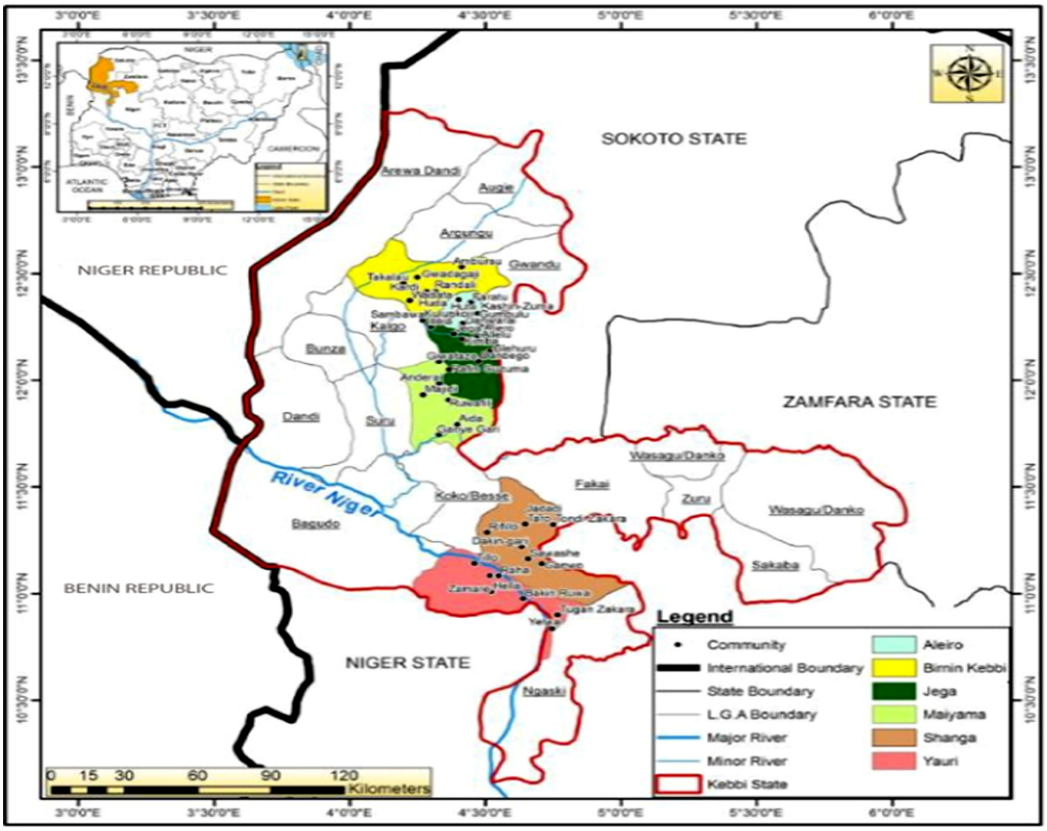

Figure 1: Visited Local Government Areas of Kebbi State

Source: Modified from the Administrative Map of Kebbi State