

# Constraints of Onion (*Allium cepa*.Var.*cepa* L.) Yield Production and Food Preference to Shallot (*Allium cepa*.Var.*aggregatum*) in the Case of Bibugn Woreda, Amhara Regional State, Ethiopia

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## Abstract

This study was conducted with the main objective of assessing the constraints of onion bulb production and its food preference to shallot at Bibugn Woreda, east Gojjam zone in Ethiopia. The relevant data were generated from both primary and secondary data sources. Sample rural farmer survey, field observation, related and relevant experts and officials' interview were the major means of generating data. Secondary data were also obtained from relevant organizations document and journal articles. Both qualitative and quantitative techniques were employed to analyze the data. The collected data was analyzed using Microsoft office Excel. The findings of the study revealed that the cultivation system of onion at the Bibugn Woreda (District) is both irrigation and rain fed with major cultivation system being irrigation. The major constraint of onion production is low water accessibility and disease occurrence. 98 % of both onion and shallot consumers prefer onion to shallot with regards to the food flavouring quality in the study area. So, rural farmers and Woreda Agriculture Office should take controlling and protection measure of onion disease either through supplying disease resistance varieties or improving cultural practices. However, the area could be suitable for onion production as far as such constraints are avoided or reduced. Chemical analysis of onion and shallot bulbs should be identified so as to recognize the case of their flavouring variability for food preference of onion.

**Keywords:** onion, shallot, food preference, Ethiopia

## 1. Introduction

Onion is by far the most important of the bulbs cultivated commercially in nearly most parts of the world (Simon, 1992). The crop is grown for consumption both in the green and mature state. A huge range of onion cultivars and land races have been developed over centuries to fit in to diverse climate and food preferences of the world (Astely, 1990).

Bulbs for consumption uncooked are frequently sweet, mild, flavoured and large, with suitable for making onion aroma. A particular type for pickling is the small, white skinned "sliver skin". On the other hand, bulbs for pickling cooked consumption and for use in food manufacturing could be the small, medium and large grades respectively from a crop of the same cultivar. Normally, bulb production is targeted at one of these outlets by controlling bulb size by making different plant density (Mondal, et al., 1986).

Onions (*Allium cepa* L. *cepa*) are a major source of flavoring in fresh and cooked food, and are the second most important horticultural crop after tomatoes. They are used, produced and traded worldwide. Bulb onions vary in flavor from very mild to extremely pungent when tasted uncooked (Crowtherd et al., 2005).

Onions are an important vegetable world-wide, ranking second among all vegetables in economic importance with an estimated value of \$6 billion dollars annually. While onions contribute significant nutritional value to the human diet and have medicinal properties, they are primarily consumed for their unique flavor or for their ability to enhance the flavor of other foods. While compounds such as sugars and organic acids can contribute to the organoleptic experience, it is a special class of biologically active organosulfur compounds which give onions their distinctive flavor and aroma. Many of these sulfur compounds can be chemically quantified, which is necessary for objectively determining flavor strength as eating just one pungent onion can destroy the ability of a person to test onions further (Teare Ketter and William, 1998).

In Ethiopia, the alliums group (onion, shallot, garlic) are the important bulb crops produced by small holders and commercial growers for both local use and for export. Among these crops, onion is rapidly becoming a popular vegetable among consumers. The statically data showed that the production and extent of onion is greater than other alliums groups (shallot, garlic.) (CSA, 1997).

Onion is produced in substantial amount in East Gojjam zone that is reported to be grown in substantial amounts and is spreading throughout the country being cultivated under both irrigated and rain fed conditions in different agro-climatic region (lemma and Herath, 1992). Despite these, onion production is limited in Bibugn woreda, provided that it is produced more in east Gojjam zone. Therefore, this study was conducted.

## 2. Materials and Methods

### Study Area

The study is carried out in Bibugn Woreda, east Gojjam zone, Ethiopia. Bibugn is located 83 km away from Debre Markos (capital of east Gojjam) which is located at 11°00'N and 37°35'E. The woreda is located in the west direction from 'Degadamot' woreda, in the north 'Huletejuenesie' woreda, in the east direction from 'huletejuenesie', and also in the south direction from 'sinan', 'machakel', 'Denbecha' and debayilatgin' woredas.

According to Bibugn Woreda Agriculture Office annual report (2011.unpublished), Bibugn has a mild climate and its altitude range from 1820-4088 meters above sea level. Its average daily temperature is moderate, mean annual precipitation is about 1200 mms and has uni-modal rainfall regime starting from June to September (Agriculture office, 2014). A dry season occurs in October through February. During dry season, many rural dwellers engage in farming.

Rural farming at Bibugn Woreda generally divided into two ways: the first is rain fed second is irrigation both in the river side. About 18,935 ha land is covered with annual crops 0.69 ha with perennial crops and 3058 ha is covered with forest. The soil type in the area is classified 44.55% red in colour, 14.9% black colour, 35.11 % brown colour and 5.44% Gray colour (Bibugn Woreda Agriculture Office, 2011).

Table 3.1 the major vegetables grown in the area

Vegetable types	Land coverage(hectare)	Suitable temp	Elevation	Rain fall
Potato	6523 hr	16--24°C	>1000m	1100-1150mm
Cabbage	129 hr	15-20°C	>800m	900-1000m
Shallot	101 hr	18-20°C	>600m	700-800mm
Pepper	103 hr	25°C	650m	750-800mm
Carrot	86 hr	16-24°C	>500m	680-870mm
Beet root	51 hr	16-18°C	>600m	700-900mm
Onion	89 hr	13-24°C	>640m	600-950mm

Source: Salunkhe, D,K and S.S Kadam (1998) and Bibugn Woreda agriculture office annual report (2013)

Potato, cabbage, shallot, pepper carrot, beetroot, and onion can grow in the study area. The land with 10% slope covers 26.92% of the area, 10 to 20% slope covers 41.2%, 20 to 30% slope covers 14.3%, 30 to 50 % slope covers 10.35% and slope above 50% covers 2.18% of the area. The agro climatic condition of the woreda constitutes 35.53% Dega, 48.06% Wionadega, 14.46% kola and 1.955% frost (Bibugn woreda annual plan, 2011). It has been demonstrated that temperature also has an important influences in that the rate of bulb formation increase with temperature increase. The physiology of growth, development and yield of bulbing has been reviewed by (Brwster, 1994).

**Population:** According to CSA (2007), the population of Bibugn Woreda rural farmer was 75,761. Out of this 37,090 (48.95%) were males and 38,671(51.05%) were females; the majority of the population in the Woreda worshiped Ethiopian Orthodox Tewahido church. 100% of the inhabitants are speakers of Amharic language. According to CSA (2013), the population projection figure of the town had been estimated 44,495 male and 46,270 female inhabitants which is a total of 90765 populations. Area of the Woreda is expected to be 399.79 sq. Km and 227 km/square density. Population refers to the total of item about which information is desired. There are 14563 farming households engaged in rural farming of which 2435 are onion producers.

### 3. Research Design

For the assessment of onion yield production constraints and food preference to shallot in Bibugn Woreda, a well-structured questionnaire with both open and close ended questionnaires were prepared. The questionnaire was prepared in English and then translated to native and national language Amharic so as to ensure better understanding of the respondents. There are 15 rural kebeles in the Woreda and purposive sampling was employed to select 4 kebeles. Each sample kebele was selected purposively based on the area coverage of onion farm land and their onion production experience. Finally questionnaires were administered to the selected households from the four chosen kebeles. To pick representative households from the preferred kebeles systematic sampling based on the document prepared by the Agriculture Office of Bibugn Woreda. The lists of farmers were marked in each selected kebele in order of their serial number like 1, 2, 3 and so on. Hence, the said document was used for picking the representative sample farmers. The total numbers of farmers in the selected kebeles which are producers of onion bulb are 2435. To determine the total sample size, the common method adopted is to use 10% of the total population; hence, 25 household farmers were systematically selected from selected kebele for the distribution of the questionnaire. Apart from questionnaire, interviews and focus

group discussions were conducted with development agents of each sample kebele and woreda experts and three hotels were interviewed for the food preference of onion to shallot in the capital of Bibugn Woreda (Digotsion).

#### **4. Results and Discussion**

##### **4.1 Onion Bulb Cultivation System in the Study Area**

Rural farming households cultivate onion through irrigation, 69% of the respondents cultivate onion by irrigation. The rest 31% of the respondents cultivate onion through rain fed agriculture. Here, the major cultivation of onion is irrigation. This shows that irrigation scheme is necessary for onion production in the area. Onion is cultivated both through irrigation and rain fed in the study area. Onion is cultivated twice a year through irrigation and once by rain fed. The agro-climatic condition is favourable for onion production, be it there are constraints. Water accessibility is also other obstacles for onion bulb cultivation. Onion bulb cultivation in the study area is more of irrigation though there is water shortage. Rain fed cultivation is less due to severity of onion bulb disease caused through rain fed cultivation.

##### **4.2 Major Constraints of Onion Production**

The study indicates that from all respondents 59% of them revealed that onion disease was the major constraints, 32% of the respondents responded that water shortage was the major constraints of onion production and 6% were responded climatic suitability is the major constraints of onion production and 3% were responded marketing of onion bulb is the major problem. This study depicted that onion disease is the major problem of onion production. Bibugn Woreda agricultural officials also assured that in the woreda, onion disease called 'root rot' are the major constraints of onion production which could not be minimized from year to year.

The climatic condition of the area is favourable to onion production and awareness of onion production is also less important. So, this shows that water shortage and disease may be interrelated cause for constraints of onion production. Onion production is declining from year to year due to disease and low water accessibility.

##### **4.3 Local Demand of Onion Bulb**

Onion is a daily flavouring food in the community. People use onion for daily food. It also used for marketing, hotels and traders. In the Woreda onion demand is higher as it is revealed from all respondents of the hotel that they bought onion from Debre Markos town, since at Bibugn Woreda there are not enough onion bulbs. Not only hotels but also rural household respondents responded that 80% of them consume their onion bulb only for their consumption need and production system; the rest 20% would be supplied for local market. This study showed that local production of onion is not enough for the local onion demand. People use shallot in the case of onion shortage. From this it is concluded that shallot is used as alternative of onion shortage.

Even though onion is produced in the Woreda, there is higher scarcity of onion for both individual and Hotel consumption for their food preparation. The case for this shortage is the severity of onion disease and water inaccessibility. So there is higher demand of onion at Bibugn Woreda. Onion production in the Amhara Region has its own constraints; some of them were disease, seed shortage and perishable nature when demand and supply became imbalance. Some natural hazards like pests and diseases retard the growth of onion (ANRS, Bureau of Agriculture and Rural Development, 2005).

##### **4.4 Food Preference of Onion to Shallot**

The local community use both onion and shallot as food flavouring ingredients. 98% of the household agreed on the onion being better flavouring ingredient than shallot. Even though people prefer onion to shallot in the flavouring ingredient, they use shallot as a common food ingredient instead of onion. It is in line with (Rubatzky and Yamaguchi, 1997) that single centre bulbs are highly desirable especially for processing as fried onion rings.

#### **5. Recommendation**

On the basis of the above findings valuable recommendations and policy implications can be drawn from the study results so that constraints of onion production could be onion disease, water accessibility creating high shortage of local onion demand at Bibugn Woreda. In the Woreda, there is no specific program or plan to tackle the constraints of onion production despite onion bulb demand is higher. The study recommends that, the accessibility of irrigation water is among the major requirements. The local community of the Woreda should cooperate and divert rivers and streams, should use underground water by digging shallow well, should also use water pumping motor technology, and use water saving technology.

Constraints of onion production is occurred at the Woreda has not been given any consideration in the growth and transformation plans. Onion production seems to have been one of the most neglected sectors in the Woreda. Nowadays, there are no interested farmers that have been working in the development of onion. The kebele and woreda agricultural experts should have to motivate and technically support farmers to improve onion production since there is higher demand of onion at the woreda. The onion production plan should be included in

the Woreda Agriculture office annual plan as in the growth and transformation plan of the country.

The study recommends that Bibugn woreda is a labour-rich, high demand of onion and the tower of water (*choke mountain, water tower of east Africa*) but low capital, low onion production and low irrigation water accessibility; onion production should be encouraged, strengthened, and given recognition in growth and transformation plan of the Woreda. Bibugn Woreda agriculture office should seriously embrace onion production as viable production that satisfies the local onion bulb demand for both individual consumption and hotel service. Therefore, it is better to focus and practice on onion production that may result for both rural farmers income and food access.

The role of agricultural extension in improving the skill and knowledge about onion production methods to farmers is one of the core activities in the farming practices, providing effective capacity building program for the farmers on the production of onion, through training, workshop, conference, field demonstration, and experience sharing particularly on water supply and onion disease controlling mechanism.

There is no doubt that Bibugn Woreda agriculture office support for onion production is crucial. In satisfying onion consumption need in the Woreda for individuals and hotels. Onion disease controlling and irrigation water shortage are the critical factors in the improvement of onion bulb production. Therefore, agriculture office has to supply disease resistant onion seed variety and/or control disease to satisfy the highly demanded onion but which could be produced well if such constraint of production is improved.

Though, onion is preferred to shallot, shallot production need to be strengthened to supply as alternative for consumers and traders. And

Researcher should identify the chemical ingredient of onion and shallot what makes difference in their food flavourings.

Researchers should focus on how to improve disease resistance variety of onion especially for root rot. And also should emphasise on the cultivation methods of onion yield so as to improve the traditional cultivation methods of onion.

Researchers also should aware how to access water in the area using alternative irrigation water accessibility options for the onion farms.

## 6. Conclusion and Summary

The findings of the study revealed that onion cultivation system in the Woreda is irrigation though water shortage is the problem of onion production. High amount of rain fall could be the cause of onion disease 'root rot' as woreda agriculture office vegetable experts suggested.

The study clearly found that the major onion cultivation system is irrigation near river side land area. Here, the water shortage is also the problem to onion production to be addressed for majority of rural farmers. The woreda annual rain fall is too high in the rainy season which could be the cause for onion disease.

Bibugn Woreda climatic condition is from woinadega to Wurch (frost). Onion production is favoured on Dega and Wionadaga in the study area. But the study showed that onion disease, water shortage is the major onion constraints

The study also ascertained that onion bulb demand is very high. The supply for both individual consumption and hotel service is too low. So, the onion production constraints cause the demand to be high and the supply to be low.

Bibugn Woreda is highly rich in availability of water, but its accessibility for the onion production is very low due to the rugged topography to divert rivers and streams for irrigation. It needs high technology to divert or to build dam.

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