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Shallot Production Status in Ethiopia: A Research Review

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Abstract

Shallot (*Allium cepa var. ascalonicum* Backer) is an important bulb vegetable crops which grown under main rain fall and irrigation condition. The paper reviewed focus on the production of shallot in Ethiopia. The main constraint for shallot production is lack of improved varieties and planting materials, inappropriate agronomic practices, disease and insects, pre and post-harvest loss management. Shallot reproduces through their bulb and true seed. The use of seed propagating shallot varieties more useful than bulb propagating varieties in terms of lower seed cost and volume of seed, higher bulb yield and quality, free disease and insect transmission, lower cost of transportation and long storage capability. Seed propagated varieties should be demonstrated and addressed for farmers

Keywords: *Allium*; Bulb; Ethiopia; True seed Shallot; Vegetables

Introduction

Shallot (*Allium cepa var. ascalonicum Backer*) is the most important sub-group of the aggregatum and the only one grown commercially. It belongs in the *Allium* group and Liliaceae/Alliaceae family. Shallots are cultivated in many tropical countries where the climate does not favour production of the common onion or where the shallot is preferred for its shorter growth cycle, better tolerance to disease and drought stresses and longer storage life than the common onion and for its distinctive flavor which persists after cooking. In Ethiopia, it is an important bulb vegetable crop cultivated by smallholder farmers for home consumption and income generation. The crop has a wide range of climatic and soil adaptation and cultivated both under rain fed and irrigated [1] condition. Shallot is mostly produced at highland areas under rain fed conditions, but the cultivation and distribution of the crop is being expanded to new area. It is one of the most important cash crops and traditionally produced in some regions of Ethiopia (Hararge, Shoa, Arsi, Gojjam etc.) by small farmers as income generating spice crop for flavoring local dishes. It is mostly produced and adapted in areas where the climate is humid (rainy season) and where the growing season is short for their being relatively tolerant to purple blotch disease [2]. Shallot has very short growing season of not more than three months, which allows it to be grown between other crops or during the short rains in the dry season of rift valley areas.

Literature Review

Major constraints and opportunities for shallot production in Ethiopia

The national average bulb yield of shallot is about 7 t ha^{-1} and it is substituted by recently introduced onion due to ease of propagation from true seeds. The production and productivity of shallot is very low as compared with the world average productivity. The major attributed factors to the low and unsuitable crop yield and quality in Ethiopia includes; lack of high yielding shallot varieties on farmer's hand and lack of superior planting materials, inappropriate agronomic and cultural practices (such as intra row plant spacing, nutrient management, diseases, insects and lack of improved pre and post-harvest management practices. Most farmers use bulb as planting materials and it is the main constraints for shallot cultivation. The amount of bulbs require for one hectare is 1.5 tons to 2 tons which comprises about 40% of cost of production compared to the 4 kg ha^{-1} of true onion transplant. In addition, the use of bulbs as planting materials can also promote diseases caused by pathogens such as viruses, fungi, bacteria and nematodes [3]. In contrast the use of botanical seed (true seed) as planting materials had an advantage of much lower seed cost, good establishment, higher bulb yield, free of disease and insect pests, lower volume of seed, lower and cheaper production cost, ease of transport and long storage capability.

Ethiopia had good opportunities for shallot cultivation and production. The availabilities of different climatic and edaphic condition, availabilities of small scale irrigation facilities, true seed shallot varieties were released by different institution, shallot is highly demanded by rural and urban people due to its good pungency [4].

Improved released shallot varieties in Ethiopia

Ethiopian Institute of Agricultural Research (EIAR) which operates at federal level, higher educational universities and regional agricultural institutes were conducting research on the improvement of vegetable crops varieties including shallot. Debre Zeit agricultural research center leads the national cool season vegetables crops research such as shallot improvement in the country [5]. Both seed and bulb propagated varieties has been released and registered by federal, regional agricultural research centers and higher educational universities. The released garlic varieties give good bulb yield and more resistance to major garlic disease and insect pests as compared

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with the farmer's local materials. The released shallot varieties give 2.5 t ha^{-1} to 4.0 t ha^{-1} bulb yield on research field (Table 1) [6].

Shallot varieties	Characteristics	Productivity (t ha^{-1})	Days to maturity	Year of release	Breeder maintainer
DZSHT-005/02	Seed propagated	-	-	2019	Debre Zeit ARC/EIAR
Improved Huruta	Seed propagated	-	-	2017	Haramaya University
Tropics	Seed propagated	-	-	2016	Melkasa ARC/EIAR
DZSHT-91-2B	Seed propagated, deep red color, large bulb size, early vegetative growth stage	4.0	150	2016	Debre Zeit ARC/EIAR
DZSHT-157-1B	Seed propagated, deep red bulb color, medium bulb size	3.4	125	2016	Debre Zeit ARC/EIAR
Minjar (DZSHT-164-1B)	Bulb propagated, dark red bulb color, medium sized bulbs, adapted to lowland to highland area	2.5	110	2009	Debre Zeit ARC/EIAR
Years (Vethalam)	Seed propagated, light red bulb color suitable for low to mid altitude	2.5	110	2005	Melkasa ARC/EIAR
Negele (DZSHT-50)	Bulb propagated, red bulb color, bigger bulb size but fewer bulbs than Huruta, adapted to mid to highland area	2.5	120	2004	Debre Zeit ARC/EIAR
Huruta (DZSHT-91)	Bulb propagated, red bulb color, big bulb size, late mature, vigorous, adapted to mid to highland area	2.5	120	1997/98	Melkasa ARC/EIAR

Table 1: Released shallot varieties in Ethiopia.

Discussion

Seed production methods: Shallot produced by vegetative method through mother bulb and their true seeds. Shallot is a biennial bulb crops that take two growing season for seed production. However, the crop is usually grown as an annual for bulb production. During the first season bulb is formed and in the second season, flower stalks and seeds was produced. Seed production in shallot can be achieved either through bulb to seed or seed to seed methods by vernalizing bulbs or growing plants, respectively. Vernalization of growing plants in the post-juvenile stage at 8°C or 12°C under 16 hours' photoperiod for a period of 60 days is recommended for high bolting.

Bulb to seed production methods: The seeds were sown and produce bulbs in the first season then select good bulb based on color, shape, size, uniformity (avoid off type, split bulbs), disease free and store for one month to break dormancy. Finally plant the selected bulbs to produce seed in the second season on ridge and furrow planting with a spacing of 40 cm × 20 cm × 10 cm between double rows, row and plants respectively. This method has an advantage of improving or maintain of purity or quality due to selection of good quality bulbs. It takes 15 to 16 months to produce seeds [7].

Reproduction of shallot through bulbs has a number of disadvantages such as the difficulty of storing bulbs and carry over of diseases. Bulb to seed phonological stags take about 8 months, depending on genetic characteristics, adaptation to the cultivated region and environmental condition. Vernalization by overwintering or by storing bulbs or seedlings at 4°C-6°C for about two months (usually 4 to 8 weeks depending on genetic characteristics) induces bulb sprouting (in the case of using bulb material) and increases bolting percentage and thus seed production [8].

Seed to seed production methods: The seed was sown and allow them grow produce flower stalks and seeds in the same season. This method doesn't give the possibility of selecting for good quality bulbs. It takes 7 to 8 months to produce seeds [9].

Seed to seed production methods require agricultural management and breeding strategies to improve bolting, flowering, seed yield and quality (such as weight and size with strong vigor), seed germination, seedling growth and at the same time to obtain high quality bulbs with marketable yield. Apart from non-dormant seeds like Improved Huruta variety, most shallot true seeds require approximately 21 to 60 days for breaking seed dormancy and 25 days for seedling growth in nursery before transplanting to the main field. Seed to bulb to seed (or seed to seed) production takes about 10 to 11 months [10].

Conclusion

Shallot is an important cash bulb vegetable crop in Ethiopia. It produced under different growing season (Rainfall and irrigation condition). Shallot produced by mother bulb and true seed. The use of true seed as planting materials had an advantage over using bulb. The

research institution and higher educational universities and agricultural experts should demonstrate the true seed shallot varieties for farmers. Additionally, private and governmental seed producer, seed enterprise, seed cooperatives and unions should be multiplying shallot seeds similarly as cereals crops. Farmers also grow shallot as onion to increase its production coverage.

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