Minireview Article

Current scenario of black pepper production in North-East India

Abstract

India, the land of spices is one of the major exportersand consumer of black pepper. Despite the land of origin India lost its top position20 years ago in pepper production. Black pepper is cultivated commercially in southern states and in small scale in north eastern India at present. Commercialized cultivation is yet to gain boost in the region.The vast areas North eastern region provides tremendous scopefor the cultivation because of diverse agro-climate, well distributed rainfall, fertile virgin land. This paper discusses the current scenario, constraints and future thrust of pepper production in north eastern region.

Comment [U1]: Add production records, can be the last 5 years

Key words: Assam, Black pepper, Cropping scenario, North East India, Pepper, Resistant varieties

1.1 Introduction

Mankind is blessed with various herbs and spices, which add more taste and flavour to our food. Among them black pepper, also known as “king of spices” is the most important and traded spice in the world. Black pepper (*Piper nigrum* L.) is a perennial flowering vine, cultivated for its berries which are dried and used as spice. It is a crop of tropical region, require humid climate and good rainfall (Senthilkumar *et al*., 2018). There are various archaeological evidences suggesting that black pepper is native to south India (Kerala) and was exported to other countries in huge quantity. Medicinal properties and uses of black pepper are well documented in ancient Vedas and Sanskrit literatures. Apart from being used as spice, black pepper is also used as preservative, insecticidal & larval control agents and drugs as Anti-apoptotic (Pathak and Khandelwal, 2007); Antibacterial (Ahmad *et al*., 2011) Anti-Colon toxin (Balkrishna, 2008); Antidepressant (Li *et al.*, 2007); Antifungal (Umit*et*

al., 2008); Analgesic, Antiriyretic, Anti-inflammatory (Parmar*et al.*, 1997); Antispermatogenic (Mishra and Singh, 2009); Antithyroid (Panda and Kar, 2003);Antitumor (Sunila and Kuttan, 2004); Ciprofloxacin potentiator (Liu *et al.*, 2009). Major bioactive component is 'piperine', which imparts medicinal properties to black pepper (Singletary, 2010).

Comment [U2]: check how to write

Black pepper is cultivated in more than 26 countries among which Indonesia, Vietnam, Brazil, Malaysia and Sri Lanka are important producers (Biju *et al.*,2013). In 2020 Vietnam was the highest exporting and producing country accounting for 59%of world'spepper export share (285,292 tonnes) followed by Brazil (89,756 tonnes) and Indonesia (51,718 tonnes)(https://www.thehindubusinessline.com).

Comment [U3]: check how to write curated literature from the web

In India, black pepper is commercially cultivated in Karnataka, Kerala, Tamil Nadu and Andhra Pradesh. Among which Karnataka is the leading state both area wise (160774 ha) and production wise, producing 36000 tons of black pepper. Keralais the second leading state followed by Tamil Nadu producing 22000 tons and 1750 tons of black pepper, respectively (Directorate of Arecanut and Spices Development, 2020-21). Since last few years black pepper cultivation is commercialised in North East (NE)states. The soils of the NE India are usually rich in organic matter and acidic in nature, thus suitable for growing wide range of spice crops. Most part of NE states have virgin land thus having tremendous potential of producing organic black pepper (Hnamte*et al.*, 2012).

2. Cropping scenario in NE India

NE region of India is known for its wide diversity in flora and fauna. Although NEregion comes under non-traditional area for pepper production but ideal factors like variation

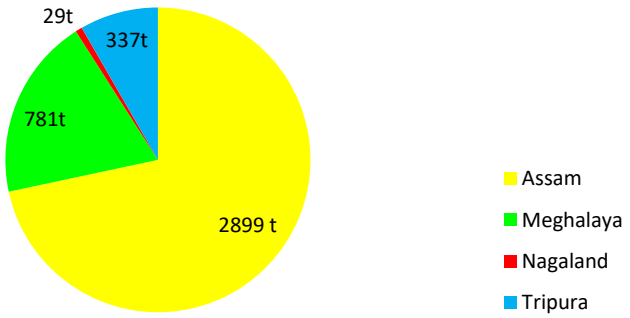

Fig 1: Major NE states producing pepper (tons)

(Data source: DASD, 2020)

Fig 2 Main districts (state wise) engaged in pepper production

inclimate (cold to warm-humid), organic matter rich soil and good well distributedannual rainfall provide immense scope for black pepper production. NE includes Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura which total account for 262,180 sq. km geographical area (Yadav*et al*., 2003).NE can harbour more than 1 million pepper vines in tea estates. It is estimated that the country can easily fulfil the requirement of international market if at least 30-50 shade trees/ha in tea estates is planted with peppercorns (Parthasarathy*et al*., 2008).

Comment [U4]: Add literature related to fertility or soil characteristics to enrich the study

2.1 Arunachal Pradesh

Arunachal Pradesh is less involved in pepper production, generally areas bordering to Assam are involved in production. State is more engaged in production of large cardamom. Government is putting efforts towards encouraging cardamom growers to put similar thrust on production of other spices.

Comment [U5]: literature sources

Comment [U6]: what are the government's efforts in an effort to provide a boost to increased production

2.2 Assam

Assam is the major black pepper producing state in NE region. Out of 33 districts 27 districts are involved in pepper production. Among which Lakhimpur district is highest producer, producing 305.6 tons of pepper (Average of 2010-11 to 2015-16). Total area engaged under black pepper cultivation is 3428 ha (Kandiannan, 2018).In 2020, state produced 2,899 tons of peppercorn (DASD, 2020).Productivity of black pepper in Assam is highest amongst all pepper producing states in India (Kandiannan*et al*., 2018).

Comment [U7]: on average what is the production, because it is called the highest?

2.3 Manipur

Black pepper production is not well commercialised in this state. Cultivation of black pepper is practised up to some extent in Juibam, Thanlon and Morena area which come under Mild Tropical Hill Zone of NE (De L., 2017)

Comment [U8]: complete the theoretical basis of the following statemen

2.4 Meghalaya

Total area under black pepper is 1000 ha, which produce 781 tons of pepper (DASD, 2020). Black pepper is grown in all districts among which West GaroHill is leading in production (63 tons) as well as in area(Kandiannan *et al*., 2018).

2.5 Mizoram

In Mizoram only72 ha of area is involved in pepper cultivation, producing 10 tonsof black pepper (Economic survey Mizoram, 2014-2015).

Comment [U9]: production of 10 tons per year or per ha?

2.6 Nagaland

Total seven districts are engaged in production accounting for 150 ha in area and producing 29 tons of pepper (DASD, 2020).Mokokchun and Dimapur are important district in the state production wise. According to Kandiannan *et al*.(2018).Kohima is one of the most efficient district in India for pepper production.

Comment [U10]: production of 29 tons per year or per ha?

2.7 Sikkim

Pepper is grown at very negligible scale. But in some areas famers have started practicing organic cultivation of black pepper.

Comment [U11]: Literature sources

2.8 Tripura

Every year Tripura produces around 337 tons of black pepper (DASD, 2020). As compared to other areas Dhalai and North Tripura are producing good quantity of black pepper(https://www.eastmojo.com/).

3.Varieties grown

Most well popularized varieties of black pepper in NE India are Panniyur -1 and Karimunda which provide good uniform yield. However other varieties which are well suited to NE region by black pepper research station, Panniyur, Kerala Agricultural University (KAU) are

Panniyur-1, Panniyur-2, Panniyur-3, Panniyur-4, Panniyur-5, Panniyur-6, Panniyur-7.Varieties released from IISR, Calicut are Panchami, Pournami, Sreekara, Subhakara, IISR Malabar Excel, IISR Shakthi, IISR Thevam and IISR Girimunda. Among these IISR Malabar Excel variety (13.5%) has highest oleoresin content (Saji and George, 2009). However, black pepper varieties suitable to high elevation area need to be developed or identified and popularized for the NE region.

4.Constraints

Although, NE region has great potential for black pepper productionthere are various factors which are causing lots of hindrance such aslack of disease free & healthy planting material,pest &diseases like *Phytopthora*foot rot, anthracnose, basal wilt and charcoal rot is prevalent, which causes direct loss. High initial cost is required for orchard establishment which is generally difficult for marginal and small farmers. Lack of awareness and information among farmers. NE region receive heavy rainfall therefore there is high rate of soil erosion and nutrients leaching. No government arbitrationin spice market which in turn makes farmers to sell the produce at very low prices to nearest merchant, buyer, shops. Absence of good agro-based industry for spices value addition (Hnamte*et al.*, 2012). Other constraints include poor transport & communication facilities, poorly organised market structure and improper management of fertilizers.

5.Future scope

Black pepper can be grown as monocrop or with arecanut or using shade trees of tea garden as standard. In international market there is huge demand for organic spices and in order to reap this benefit NE region can be exploited for organic black pepper cultivation, since most of the NE states have virgin land and use of chemical fertilizer and pesticides is far below country's average (Hnamte*et al.,* 2012). Another scope is for value added products such as

Dehydrated green pepper, Canned green pepper, Bottled green pepper, Dry packed green pepper, Freeze dried pepper, White Pepper, Pepper Oil, Oleoresin, Ground Pepper. Many small scale industries can be established which will help in elevating the standard of living of farmers. It is predicted that future demand for black pepper will increase up to 1.28 lakh tons till year 2026-2027 (Parthasarthy*et al*., 2008). To obtain the benefit of the demand, non-traditional black pepper producing region such as NE states can be exploited by using improved technologies, high yielding varieties which are well suited to high elevation area, improved tactics for pest and disease management (Saji and George, 2009). To harness the potentiality of region, making farmers aware of new technologies, market information and influencing them to from organization/co-operatives is required (Hnamte*et al.*, 2012).

6.References

Comment [U12]: Use medeley or zatero

Ahmad N, GuoB,FazalH, AbbasiBH, LiuCZ,MahmoodT,Shinwari, Z.K.Feasible plant regeneration in black pepper from petiole explants. J Medicinal Plants Res.2011;5(1): 4590-4595.

Balkrishna A.AyurvedJadiButiRahasya. FifthEdn. DivyaPrakashanPatanjaliYogpeeth, Maharishi Dayanand Gram, Haridwar, India;2008.

Biju C, RavindranP, DarshanaCN, JashmiKC.Epidemiological studies of black pepper anthracnose (*Colletotrichum gloeosporioides*). Ind JAgriSci.2013;83(4):1199–1204.

Hnamte V, Chatterjee R, ChattopadhyayP K,PariariA.Spices scenario in the North Eastern States of India with special reference to production and marketing. Journal of Crop Weed. 2012:8:109-112.

Kandiannan, K. Delineation of efficient black pepper zones in North East and South India; 2018.

Li S, WangC,LiW, KoikeK,NikaidoTand WangMW. Antidepressant-like effects of Piperine and its derivative, antiepilepsirine. Journal ofAsian Natural Products Research.2007;9(3):421-430.

Liu JP, WuHS, YangJ. F. Review of domestic and foreign varieties of Black Pepper. China Tropical Agriiculture.2009;9:49-52.

Mishra RK, SinghSK. Antispermatogenic and antifertility effects of fruits of *Piper nigrum* L. in mice. Indian Journal Experimental Biology.2009;47(2):706-714.

Panda S, KarA. Piperine lowers the serum concentration of thyroid hormones, glucose and hepatic 5D activity in adult male mice. Hormone andMetabolic Research.2003;35(1): 523.

ParmarVS, JainSC, BishtKS,JainR, TanejaP, JhaA, TyagiOD. Phytochemistry of the genus Piper. Phytochemistry.1997;46(3):597-673.

Parthasarathy VA, SrinivasanV, MadanMS. Black pepper Research for future. (Eds. Krishnamurthy KS, KandiannanK, SuseelaR,SajiKV and Parthasarathy VA) National Seminar on Piperaceae Harnessing Agr-technologies for Accelerated Production of Economically Important Spices. Calicut;2008.

Pathak N, KhandlewalS. Role of oxidative stress and apoptosis in cadmium induced thymicatropy and splenomegaly in mice. Toxicology Letters.2007;169: 95.

Saji KV,GeorgeK. Genetic diversity of black pepper and its suitability to North eastern states. In: Harnessing the potential of North eastern states for spices production through technological interventions. Indian Society for Spices,Calicut;2009.

Senthilkumar S, SwarupaP. A Quantitative Description of Pepper Cultivation in Kerala. International Journal of Emerging Research in Management and Technology. 2018;7(1):1-6.

Singletary K. Black Pepper: Overview of Health Benefits. NutritionToday.2010;45:43-47.

Sunila ES,Kuttan, G. Immunomodulatory and Antitumor activity of Piper longum Linn. andPiperine. Journal of Ethnopharmacology.2004;90(5):339-346.

Umit A, KadirI, AkgunKO. Antifungal activity of aqueous extracts of spices against bean rust (*Uromycesappendiculatus*). Allelopathy Journal. 2008;24(11):0973-5046.

Yadav RK, YadavDS, RaiN, PatelKK. Prospects of horticulture in North Eastern Region. ENVIS Bulletin Himalayan Ecology. 2003;11(3):10-25.