



RESEARCH ARTICLE

Status and Development of Exotic Crops in Khandesh Region of Maharashtra (India): A Plea for Agrobiodiversity Conservation

¹Khairnar S. B., ²Patil M.V. and D.A. Patil³

¹Department of Botany, B.S.S.P. Mandal's Arts, Commerce and Science College, Songir-424309, Dist. Dhule (M.S.)

^{2,3}P.G. Department of Botany, S.S.V.P.S's L. K. Dr. P. R. Ghogrey Science College, Dhule-424005 (M.S.) India.

*Corresponding Author: sbk12472@gmail.com

Manuscript Details

Manuscript Submitted : 10/04/2021

Manuscript Revised : 17/06/2021

Manuscript Accepted : 18/08/2021

Manuscript Published : 16/09/2021

Available On

<https://plantaescientia.com/ojs>

Cite This Article As

Khairnar S. B., Patil M.V. & D.A. Patil, (2021). Status And Development of Exotic Crops in Khandesh Region of Maharashtra (India): A Plea for Agrobiodiversity Conservation . *Pla. Sci.* 2021; Vol. 04 Iss. 04 & 05:230-235.

Copyright



© The Author(s). 2021. Open Access
This article is distributed under the terms
of the Creative Commons Attribution
4.0 International License

<http://creativecommons.org/licenses/by/4.0/>

Indexed In

[CrossRef](#), [Scientific Indexing Services \(SIS\)](#), [Google Scholar](#), [Index Copernicus International \(ICI\)](#), [Directory of Research Journal Indexing \(DRJI\)](#), [CiteFactor](#), [Scientific Journal Impact Factor \(SJIF\)](#), [General Impact Factor](#), [Journal Factor](#), [Cosmos Impact Factor](#), [PKP Index](#), [AJIFACTOR Indexing](#), etc.

ABSTRACT

Selective utilization of limited crop species threatened some other crop species. This trend rendered some crop species into underutilised grain crops throughout. At this backdrop, the present authors inventorised agrobiodiversity in Khandesh region of Maharashtra (India). The area was visited in different seasons. The tribal farmers were interviewed to tap down information with respect to agroclimate, yield, characteristic features etc. Actual field visits were also made in study area. The crop species were deciphered using standard state, regional and district floras, besides the manuals and cyclopedia of cultivated plants. Total 17 exotic crop species were investigated belonging to cereals, millets, pulses and edible oil-yielders. The data accrued has been evaluated with the relevant national and international scenario. A need for their conservation is earmarked with particular emphasis on underutilised millets. The subject-matter is further dilated in view of their importance for the welfare tribal people in the area and developing countries.

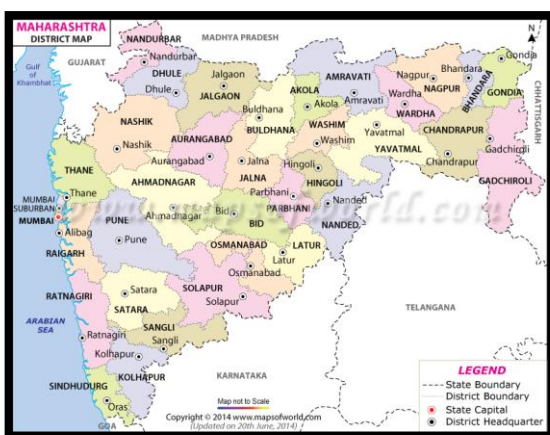
Keywords: Exotic Crops, Khandesh, Maharashtra, Conservation.

INTRODUCTION

The prime necessity of mankind is the food which comes from vegetable kingdom in different forms. Man's oldest occupation is cultivation of plants. Plants from wild sources were domesticated in different geographical areas and cultures. Man's most outstanding necessity is also an adequate food supply. Before domestication of plants for food sources, man devoted his entire time in search of food and led life of hardships. Even in modern period, man is witnessed by agrarian crisis because of selective utilization of crops and their forms of germplasm. Green evolution also aggravated this situation since only few crop sources are emphasized for their development and increase in food yield. This trend marginalised some crop species and now they are on the threshold of depletion in many areas. The present authors, at this backdrop extended research on agrobiodiversity particularly in tribal-dominated areas in Khandesh region of Maharashtra (India). This attempt has laid special attention of exotic crop species. Their diversity, origin and necessity are, therefore, being communicated in this paper.

STUDY AREA

Khandesh is the North-Western region of Maharashtra state in India. The districts viz., Dhule, Nandurbar and Jalgaon constitute the Khandesh region. It has a common border with the adjacent states of Gujarat and Madhya Pradesh and district boundaries with Nasik, Aurangabad and Buldhana districts of Maharashtra. It extends between 20°8' and 22°7' north latitude and 73°42' and 76°28' east longitude (Map I-II). Ranges of Western Ghats (Sahyadri Mountain) extend in easterly direction and north-western border adjacent to Gujarat and Madhya Pradesh has Satpura mountain in wall-like manner. The forests are mainly dry deciduous type. The main river and its tributaries drain in the west Arabian sea.



Map-I: Maharashtra showing position of Khandesh Region (Dhule, Nandurbar and Jalgaon Districts)



Map-II: Khandesh Showing Tribal Tehsils

PEOPLE

Apart from urban population, the tehsils bordering Nashik district, Gujarat and Madhya Pradesh are tribal-dominated. The main tribes inhabiting this region are Kokani (Kokana), Mawachi, Pawara, Bhil and Tadwi. They have small land holding and also depend on forest resources. They rear few domestic animals. Khandesh is an agrarian in nature and cultivate traditionally some cereals, millets, pulses, oil-yielding crops etc. for their sustenance.

METHODOLOGY ADAPTED

This region was inventorised during 2008-2015 for studies in agrobiodiversity particularly in tribal-dominated tehsils. The tribal farmers, elder men and women were interviewed from different villages and hamlets in different seasons. Actual field visits were paid during various agricultural operations. Crop plants, useful parts, local name, phenological period, seasons, etc. were recorded. These crop species were deciphered using state, regional and districts floras, manuals and encyclopedia (cf. Cooke 1958; Sharma *et al*, 1996; Singh *et al*, 2000; 2001; Naik 1998; Patil 2003; Kshirsagar and Patil, 2008; Bailey, 1949, 1950, 1958, 1963). The present communication includes exclusively exotic crop species. Their nativity is authenticated by relevant taxonomic literature. The plant and family names, local and English common names, nativity alongwith relevant references are provided in the table-I.

RESULTS

This inventory reports only exotic crop species especially from tribal region of Khandesh region of Maharashtra (India). In all, the tribal farmers cultivated exotic crop species belonging to 17 genera and 04 families of angiosperms. The split-up of these crop groups is as:

(i) Cereals: 02 species, 02 genera and a single family Poaceae

(ii) Millets: 06 species, 06 genera and a single family Poaceae

(iii) Pulses: 04 species, 04 genera and a single-family Fabaceae. (iv) oilseeds: 05 species, 05 genera under 03 families viz, Fabaceae, Brassicaceae and Asteraceae. Some of these crops are diverse as such:

(i) *Triticum aestivum* (01)

(ii) *Zea mays* (11)

(iii) *Eleusine coracana* (02)

(iv) *Panicum sumatrense* (03)

(v) *Paspalum scrobiculatum* (01)

(vi) *Pennisetum americanum* (02)

(vii) *Setaria italica* (01)

(viii) *Sorghum bicolor* (25)

(ix) *Cicer arietinum* (01)

(x) *Lens culinaris* (1)

(xi) *Pisum sativum* (01)

(xii) *Vigna unguiculata* (09)

(xiii) *Arachis hypogaea* (01)

(xiv) *Brassica juncea* (01)

(xv) *Glycine max* (01)

(xvi) *Guizotia abyssinica* (01)

(xvii) *Helianthus annuus* (01)

The figures in parenthesis denote cultivars in study area.

DISCUSSION

Agrobiodiversity focuses mainly on that portion of the biodiversity that has undergone selection and modification over millennia by mankind to serve his better needs (Subramanian and Thirumeni, 2007). It refers to the variety and variability of plants. It has to play a great role in sustaining and strengthening the food and nutritional security and health of human families, communities and nations. Obviously, its rapid depletion causes threat to welfare of mankind (World Bank, 2008).

The above results of inventory on agrobiodiversity particularly belonging to exotic crops in tribal dominated area of Khandesh are rather fair. The agrobiodiversity studied belong to various agronomic plant groups viz, cereals, millets, pulses and oil-yielding ones. It appears relevant to dilate the subject-matter at the backdrop of national and international scenario.

(i) *Sorghum bicolor* (Sorghum) is the 5th most important crop in the world. These are five basic races viz, bicolor, guinea, caudatum, durra and kafir (Seetharam *et al.*, 2007). It has received fair attention in view of diversity, conservation, distribution and germplasm collection (Elanovan, 2007; Seetharam *et al.*, 2007; Prasada Rao *et al.* 2006, 1995; Gopal Reddy *et al.*, 2006). The present account also shows fair diversity of cultivars or landraces in Khandesh region. These are well suited to the agroclimatic zone and needs of native tribal communities. Hybrid varieties are attracting tribal farmers. These obviously need conservation.

(ii) *Pennisetum americanum* (Pearl millet) is the 6th most important crop in the world. It is 2nd to Sorghum. Its germplasm is conserved in the 48 countries. About 21 landraces from Eastern Ghats and 14 landraces from Rajasthan state are documented in India. Although 30 hybrids have been released during 1987 to 2005, decrease in area is recorded (Seestharam *et al.*, 2007). Khandesh region has only two cultivars that too in tribal areas. Its hybrid varieties are more in vogue in other area of Khandesh, At this backdrop the two cultivars, being rare, need conservation.

(iii) *Panicum sumatrense* (Little millet) is a minor millet and cultivated mainly in India. It is quick-growing and adapts well in poor soil (Deshaprabhu, 1966). About 25 landraces from Eastern Ghats in India are reported (Seetharam *et al.*; 2007). During 1987 to 2001, India has released 09 varieties. Only 03 cultivars are noted in Khandesh region. Being important for food and fodder, these need to be conserved.

(iv) *Vigna unguiculata* (Cowpea) is cultivated in Africa, Asia (including India), and West Indies, America and Caribbean area. A large number of collection of cultivars is found in IITA in Ibadan, Nigeria, USA and India (Grubben, 1977). As many as 09 cultivar/ landraces are being cultivated in Khandesh as a pure or mixed crop. It is important as pulse, green vegetable and even fodder. It can be cultivated in different seasons and hence important and a perennial source for varied use-reports. Obviously, these varieties need a special attention.

Other crop species reported from Khandesh region exhibited not much of diversity and represent only a single cultivar. Many hybrids are being grown. No local cultivars are on record. These are also cultivated in tribal areas to suffice various daily needs. Wheat, Sorghum, Pearl millet, Maize, Chickpea, Garden Pea, Groundnut and Sunflower are under cultivation with other hybrid varieties in non-tribal area of Khandesh as they yield more.

Nevertheless, The millets in general, whether exotic or indigenous to some countries, deserve special attention. These are ancient crops but orphaned or forgotten because of their low yield. Most of them are on the verge of extinction. This precarious situation, of late, is being redeemed as they are of great flavour, taste, nutritional profile, high antioxidants, gluten-free, vital trace elements and even evidence-based health benefits. They are regaining the fame as 'superfood grains' (Patil, 2020).

CONCLUSIONS

The present inventory and resume of past literature indicates that:

(a) millets, in particular, adapt fairly, strengthen food and nutrition security

(b) they have a wide genetic adaptation and able to grow in diverse soils, varying rainfall regimes and diverse photoperiods

(c) they have potential to thrive with low inputs and bear varied edaphoclimatic stresses

(d) and now has immersed as 'superfood grains'. In the scenario of climate change and specially for poor tribal farmers in developing nations, they appear the best candidates to conserve for their well-beings.

Attention is but desired to increase their total yield so that they can be favoured in place of other crops.

ACKNOWLEDGEMENTS

The authors are thankful to the authorities of Shri Shivaji Vidya Prasarak Sanstha, Dhule (Maharashtra, India) . Junior author (KSB) is also thankful to the authorities of B.S.S.P. Mandal's Arts, Commerce and Science College, Songir, District Dhule (Maharashtra, India) for laboratory and library facilities.

REFERENCES

- Bailey L. H. (1949) Manual of Cultivated Plants The MacMillan Co.,New York,USA.
- Bailey L. H. (1950, 1958, 1963) The Standard Encyclopedia of Horticulture.Vol.I,II and III.The MacMillan Co.,New York, USA
- Borthakur S. K., Sarma T. R., Nath K. K. and P. Deka (1998) The house gardens of Assam : A Traditional Indian Experience of Management and Conservation of Biodiversity – I and II. *Ethnobotany* 10 : 32 – 37 .
- Borthakur S. K., Sarma T. R., Nath K. K. and P. Deka (1999) The house gardens of Assam : A Traditional Indian Experience of Management and Conservation of Biodiversity – I and II. *Ethnobotany* 11 : 65 – 80.
- Cooke T. (1958) Flora of the Presidency Of Bombay Vol I – III Bot. Surv. India (Rev.Ed.) Calcutta, India.
- Dar G.H., Bhagat R. C. and M. A. Khan (2002) Biodiversity of the Kashmir Himalaya. Valley Book House, Srinagar, India.
- Deshprabhu S. B. (1966) The Wealth of India : Raw materials. Vol-7. PP.208-210. Publ. and Information Directorate (CSIR), New Delhi, (India).
- Devendra C. and T. Thomas (2002) Crop - Animal Systems in Asia : Importance of livestock and characterization of agro-ecological zones. *Agricultural Systems*:71:5-15.
- Elangovan M. (2007) Sorghum Germplasm Collection and Conservation. In : Agrobiodiversity Vol.1 Crop Genetic Resource and Conservation (Eds. S. Kannaiyan and A. Gopalam). Associated Publishing Co., New Delhi. PP. 75-86.
- Gaikwad S.P. and K.U. Garad (2015) Flora of Solapur District. Laxmi Book Publications, Solapur, Maharashtra, India.
- Gopal Reddy V, HD Upadhyaya and CLL Gowda (2006) Current Status of Sorghum Genetic Resources at ICRISAT : Their Sharing and Impacts, SAT *ejournal/ejournal.icrisat.org,2(1)* www.icrisat.org.
- Grubben G. JH (1977) Tropical vegetables and their Genetic Resources International Board for plant Genetic Resources, Rome, Italy PP. 191.
- John Cameron (1891) Catalogue of Plants In The Botanical Garden, Bangalore And Its Vicinity (2nd Ed.). Mysore Government Central Press, Bangalore, India.
- Kaul M. K. (1986) Weed Flora of Kashmir Valley, Scientific Publishers, Jodhapur,

- Kshirsagar S. R. and D. A. Patil (2008) Flora of Jalgaon District of Maharashtra, Bishen Singh Mahendra Pal Singh, Dehra Dun, India.
- Kulkarni D. K. and M. S. Kumbhojkar (1993) Kitchen garden plants of Mahadeokoli Tribe in Maharashtra *Ethnobotany* 5 : 119-127.
- Kumar B. M. and P. K. R. Nair (2004) The enigma of tropical homegardens. *Agroforestry System*. 61. 135 – 152.
- Mitra S.K. and P.K. Pathak (2009) Underutilised Plant Species : Implications in Homestead Farming. In : Proceedings of the International Symposium on 'Underutilised Plants For Food Security, Nutrition, Income and Sustainability Development', Vol. I. (Ed. Jaenicke *et al.*), *Acta Hort*. 806, ISHS. PP. 107-114.
- Naik V.N. (1998) Flora of Marathwada Vol. I –II. Amrut Prakashan, Aurangabad (M.S.) India
- Ninez V.K. (1984) Household Gardens: Theoretical Considerations On An Old Survival Strategy. International Potato Center, Lima, Peru.
- Naqushi R.A. and G.N. Javeid (1987) Tribe Brassiceae (Brassicaceae) in Kashmir Himalaya. *J.Econ. Tax. Bot.* 9, 89-96.
- Patil, D.A. (1990) Exotic elements in the flora of Dhule district (Maharashtra). *J.Econ. Tax. Bot.* 14. (3):721-724 .
- Patil D.A. (2003) Flora of Dhule and Nandurbar Districts of Maharashtra, Bishen Singh Mahendra Pal Singh, Dehra Dun , India.
- Patil D.A. (2019) Food Crops: Evolution Diversity and Advances. Scientific Publishers, Jodhpur, India.
- Patil D.A. (2020) Agrobiodiversity and advances in the development of millets in changing environment. In: Sustainable Agriculture in the Era of Climate Change (Eds. R. Roychawdhary *et al.*). Springer Nature ,Switzerland. <https://doi.org/10.1007/978-3-030-45669-6-27>
- Prasada Rao K. E., Gopal Reddy V. and JW Stenhouse (1995) Sorghum genetic resources at ICRISAT. *Asia Centre, International Sorghum and Millets, Newsletter*, 36: 15-19.
- Purseglove J. W. (1972) Tropical Crops: Monocotyledon. 2 Vols. Longmans, London, UK.
- Samati H. (2004) Kitchen garden plants of Pnar tribe of Jaintia Hills district (Meghalaya). *Ethnobotany* 16 : 125-130.
- Seetharama N., Elangovan M., Khairwal I. S., Krishne Gowda K .T., Seetharama A., Vilas A., Tonapi and N. Sivaraj (2007) Sorghum and Millet Genetic Resources Management. In : Agrobiodiversity, Vol I : Crop Genetic Resources and Conservation (Ed. S. Kannaiyan and A. Gopalam) Associated Publishing Co., New Delhi, India. PP. 42-74.
- Sharma B. D., S. Karthikeyan and N. P. Singh (1996) Flora of Maharashtra State Monocotyledons. Bot. Surv. India, Calcutta, India.
- Shetty, B. V. and V. Singh (1987) Flora of Rajasthan Vol. I. Bot. Surv. India, Calcutta, India.
- Singh A. K. and S. N. Nigam (2017) Ancient alien crop introductions integral to Indian agricultural : An overview. *Proc. Indian Natn. Sci. Acad.* 83(T3):549-568.
- Singh N. P., Lakshminarsimhan. P. and S. Karthikeyan (2000) Flora of Maharashtra State : Dicotyledons Vol. I. Bot. Surv. India, Calcutta, India (Assisted by Lakshminarsimhan and P.V. Prasana).
- Singh N. P., Lakshminarsimhan. P., Karthikeyan S. and P. V. Prassanna (2001) Flora of Maharashtra State : Dicotyledons Vol. II. Bot. Surv. India, Calcutta, India.
- Subramanian M and S. Thirumeni (2007) Genetic Diversity in Rice and Conservation of Germplasm In : *Agrobiodiversity Vol- I : Crop Genetic Resources And Conservation* (Ed. S. Kannaiyan and A. Gopalam). Associated Publishing Co., New Delhi, India. PP. 1-17.
- World Bank (2008) www.worldbank.org
- Yadav S. R. and M. M. Sardesai (2002) Flora of Kolhapur District. Shivaji University, Kolhapur, (M.S.) India.

Plantae Scientia, 2021

Table 1 : Exotic Crops in Khandesh and their nativity

Sr. No.	Crop Name	Family & Local Name	Common English Name	Nativity & References
Cereals				
1	<i>Triticum astivum</i> L.	Poaceae (Graminae) Gahu	Wheat	Fertile crescent (Singh and Nigam (2017).
2	<i>Zea mays</i> L.	Poaceae (Graminae) Maka	Maize	Central America (Purseglove, 1972)
Millets				
3	<i>Eleusine coracana</i> (L.) Gaertn.	Poaceae (Graminae) Nagali	Finger millet	Tropical Africa (Gaikwad,& Garad , 2015)
4	<i>Panicum sumatrense</i> Roth ex Roem. & Schult.	Poaceae (Graminae) Sawa	Little millet	Asia (Excl. India)(Kaul, 1986)
5	<i>Paspalum scrobiculatum</i> L.	Poaceae (Graminae) Kodra	Kodomillet	Tropical Africa (Singh and Nigam (2017).
6	<i>Pennisetum americanum</i> (L.) K.Schum.	Poaceae (Graminae) Bajara	Pearl millet	Tropical Africa (Purseglove, 1972)
7	<i>Setaria italica</i> (L.) P. Beauv.	Poaceae (Graminae) Rala,Rawal,Bhadi	Foxtail millet	China, Patil, 2019. Asia (Excl. India) (Kaul, 1986)
8	<i>Sorghum bicolor</i> (L.) Moench.	Poaceae (Graminae) Jawar	Sorghum	North Eastern Quadrant of Africa/Ethiopia (Singh and Nigam 2017)
Pulses				
9	<i>Cicer arietinum</i> L.	Fabaceae (Papilionaceae) Harbhara	Chickpea	Mediterranean Region (Shetty&Singh,1987) and South Europe (Patil, 1990).
10	<i>Lens culinaris</i> Medic.	Fabaceae (Papilionaceae) Mathur, Masur	Lentil	Mediterranean Region and West Asia (Shetty & Singh, 1987)
11	<i>Pisum sativum</i> L.	Fabaceae (Papilionaceae) Watane, Watana	Garden Pea	West Asia (Shetty & Singh , 1987).
12	<i>Vigna unguiculata</i> (L.) Walp. subsp. <i>Vigna cylindrica</i> (L.)van Eseltine	Fabaceae (Papilionaceae) Chawali	Cow pea	West Central Africa (Singh and Nigam (2017).
Oil Seeds				
13	<i>Arachis hypogaea</i> L.	Fabaceae (Papilionaceae) Bhuimug	Groundnut, Peanut	Brazil (Shetty & Singh, 1987), South America (Yadav & Sardesai, 2002).
14	<i>Brassica juncea</i> (L.) Koch	Brassicaceae (Cruciferae) Mohari, Rai	Indian mustard	Europe (Naqshi & Javeid, 1987; John, 1891)
15	<i>Glycine max</i> (L.) Merr.	Fabaceae(Papilionaceae) Soyabean, Gandituri	Soybean	Asia (Excl. India) (Dar <i>et. al.</i> , 2002).
16	<i>Guizotia abyssinica</i> (L.f.)Cass.	Asteraceae(Compositae) Kali til, Khurchani	Niger	Tropical Africa (Naik,1998; Yadav & Sardesai, 2002).
17	<i>Helianthus annuus</i> L.	Asteraceae(Compositae) Suryaphul	Sunflower	Western USA(Sing <i>et. al.</i> ,2001, Patil, 2003)