Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

J P P Journal of Pharmacognosy and Phytochemistry

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(1): 1891-1895
Received: 07-11-2017
Accepted: 08-12-2017

Seema Tripathi
Bhoramdev College of Agriculture, Kawardha, Chhattisgarh, India

KK Pandey
S.K. College of Agriculture and Research Station, Kawardha, Kabirdham, Chhattisgarh, India

Correspondence
KK Pandey
S.K. College of Agriculture and Research Station, Kawardha, Kabirdham, Chhattisgarh, India

Cultivation trend and prediction of smaller millets for livelihood enrichment of tribal of Chhattisgarh plain zone of Chhattisgarh: An overview

Seema Tripathi and KK Pandey

Abstract
Smaller millet has large potential to provide nourishing food to subsistence farmers in Africa and elsewhere. Smaller millet (Kodo) (*Paspalum Scrobiculatum var. Scrobiculatum*). Under the present investigation the Kodo millet and district Kabirdham of Chhattisgarh State has been used under the investigation for the Kodo millets along with total cereal for the last 15 year (1998-99 to 2012-13). The correlation coefficient has been calculated between area and production on district level and state level as well. The percent contribution has been calculated for the same. Simple linear regression model has been used for the calculation of prediction of Production on different particulars. The correlation Coefficient between crop production on district level (Kabirdham) and State level (Chhattisgarh) is high and positive i.e. 0.938 and district level and total cereal is 0.697. The contribution in percent in respect of area is ranging from 9.15 to 11.35; maximum contribution in area has been found 14.32 in 2002-03 followed by 14.08 in the year 2003-04 production is ranging from 9.52 to 9.32; maximum contribution in production has been found 14.46 in 2002-03. The best model for the prediction is model 5 the parameters for the evaluatin is R^2 and significance level.

Keywords: smaller (Kodo) Millets, Correlation and Regression, R^2, Percent Contribution, etc

Introduction
Nutrition security implies awareness and access at affordable cost to balanced diet, safe environment and drinking water and health care outreach. Millets contribute towards balanced diet as well as safe environment. They are nature's gift to humankind. Millets are a treasure-trove of micronutrients like B-complex vitamins and minerals whose deficiencies in India are rampant. They also contain fibre and health promoting phytochemicals which function as antioxidants, immune stimulants etc., and thus have potential to mitigate degenerative diseases such as diabetes, CVD, cancer etc.

Kodo (*Paspalum Scrobiculatum*) var. *Scrobiculatum*, order Poales, Family Poaceae, is grown in India, as an important crop, while P. Scrobiculatum var. Commersonii is wild variety indogenous to Africa Heuzé (2012) [3]. The domestication process is still ongoing. In southern India, it is called kodo or kodra, and it is grown as an annual (ICRISAT, 2013) [5]. It is a very hardy crop that is drought tolerant and can survive on marginal soils where other crops may not survive, and can supply 450–900 kg of grain per hectare, Heuzé (2012) [3]. Kodo millet is a monocot and an annual grass that grows to heights of approximately four feet (Kodomillet 2013) [4]. It has an inflorescence that produces 4-6 racemes that are 4–9 cm long. Its slender, light green leaves grow to be 20 to 40 centimeters in length. The seeds it produces are very small and ellipsoidal, being approximately 1.5 mm in width and 2 mm in length; they vary in colour from being light brown to a dark grey. Kodo millet has a shallow root system which may be ideal for intercropping. Heuzé (2012) [3].

Kodo is rich source of Protein (8.3g), Low Fat (1.4g), Calcium (mg) (27.0), Iron (mg) (0.5), Zinc (mg)(0.7), Thiamine (vitB1) (mg) (0.33), Riboflavin (vitB2) (mg) (0.09), Folic Acid (mg) (23.1), Fiber (g)(9.0) per 100 g (Gopalan et.al.1989) [2]. Finger millet (ragi) is an extra ordinary source of calcium. Though low fat content, it is high in PUFA (Poly saturated fatty acid), (Antony *et al.*1996) [1].

The area (in million ha), production (in million tonnes) and yield (q/ha) during last 50years in India under the small millets was 5.34, 2.07 and 3.88; 4.56, 1.56 and 3.41; 4.67, 1.92 and 4.12; 3.16, 1.22 and 3.86; 1.66, 0.78 and 4.69; 1.06, 0.47 and 4.43; 0.91, 0.45 and 4.91; 0.80, 0.46 and 5.65 for the year 1955-56, 1965-66, 1975-76, 1985-86, 1995-96, 2005-06,2008-09 and 2011-2012 respectively.

Vegetables in homestead gardens for home consumption to ensure household food and Consumption, include: "Initiative for Nutritional Security through Intensive Millets Promotion" (INSIMP), under the Rashtriya Krishi Vikas Yojna of Government of India, "Revalorising Small Millets in the Rain-fed regions of South Asia (RESMISA) funded by International Development Research Centre (IDRC) and CIDA (Canadian funds), and DSR-led value chain development approach for commercialisation of millets. Millets are an important component of the National Agriculture Innovation Projects of ICAR, and All India Coordinated Project in Home Science, Other policy initiatives include: price and procurement support for millets, inclusion of millets in the Mid day meal programme and, promotion of Nutrifarms.

Material and Methods

Millets are drought, temperature and pest tolerant and hence are grains for the future in an environment of climate change and global warming. The study has been carried out for the Kabirdham district, which is under the Chhattisgarh Plane Zone of Chhattisgarh. The data has been procured for last 15 years (which is available on the web site of Agriculture department of Chhattisgarh. The data on the Area, Production and Productivity has been procured from the department of Agriculture, Govt of Chhattisgarh, on Kabirdham district and whole Chhattisgarh for the Kodo millets and total cereal as well on the respective years.

The correlation between Area and Production calculated by Karl Pearson's Correlation Coefficient (Pearson, 1895) [8].

$$r = \frac{COV(X,Y)}{\sigma_X \sigma_Y}$$

Where,

COV is Covariance between X and Y.

σ_X σ_y is the Standard Deviation of X and Y.

The role of smaller (Kodo) millets in Area, Production and Productivity has been calculated by the given formula and it is converted into percentage.

$$\%Contributi\ on = \frac{TotalArea\ /\ production\ ofDistrict}{TotalArea\ /\ production\ ofState} x100$$

$$\%Contribution = \frac{TotalArea\ /\ productionofCrop}{TotalArea\ /\ productionofTotalCereal} x100$$

The prediction equation has been used for the calculation of the production (Pre harvest) of Kodo millets if the area is already given:

$$A = 8.83 + 2.67P$$

Where,

A= Area (in million hectare)

Y= Yield (in million tonnes)

Results and Discussion

The correlation Coefficient between crop production on district level (Kawardha) and State level (Chhattisgarh) is high and positive i.e. 0.938, which indicates that proportionally increasing or decreasing of yield on district level when the yield will increase or decrease on state level. The correlation between kodo yield at district level and total cereal production in respective year is 0.697. The relation between kodo yield in Chhattisgarh and total cereal production in Chhattisgarh is indicating in term of correlation coefficient which is (0.734) positive (Table 1).

Kabirdham district of is playing important role for the production of Kodo millets in Chhattisgarh. The contribution in percent in respect of area is ranging from 9.15 to 11.35; maximum contribution in area has been found 14.32 in 2002-03 followed by 14.08 and 13.91 in the year2001-02 and 2003-04 respectively. Moreover, the percent contribution in of production is ranging from 9.52 to 9.32; maximum contribution in production has been found 14.46 in 2002-03 followed by 16.75 and 15.73 in the year 2001-02 and 2004-05 respectively Table (2). Kodo millet has important Contribution in total cereal production of Chhattisgarh but the trend is steadily decline in last 15 years with respect of area and production as well Table (2).

Simple linear regression model has been used to develop the pre harvest forecast model for all the five cases. Model 1 indicates that 80% efficient and highly significant for the calculation of production of Kodo millets for the given Area of Kabirdham district. Same as we can calculate the production for the Chhattisgarh state with model 2, which has 76% R^2 and highly significance. Least R^2 (41% only) and least significance found in model 3for the total cereal production in Chhattisgarh. We can easily calculate the percent contribution in production of Kodo millets by model 4. The R^2 of model 4 is 85% and significant at 0.01% level of significant. Most significant and accurate model is model 5. The R^2 of the model is 93% and significant level 0.01 i.e. indicates that the most efficient model is model 5 (Table 3).

Table 1: Correlation coefficient between Area, Production and Productivity

Production of Kabirdham and Production of Chhattisgarh for Kodo millet	0.938
Production of Kodo millet in Chhattisgarh and total cereal production	0.697
Production of Kodo millet in Kabirdham and total cereal production	0.743

Table 2: Area and Production Contribution (percent) of Kabirdham District for Chhattisgarh State.

Year	Area Contribution in Chhattisgarh	Production Contribution in Chhattisgarh	Area Contribution in Chhattisgarh	Production Contribution in Chhattisgarh
1998-99	11.03	9.52	5.856	1.736
1999-00	10.94	12.61	5.721	1.260
2000-01	13.27	13.31	5.807	1.269
2001-02	14.08	16.75	5.525	1.047
2002-03	14.32	18.46	5.182	1.048
2003-04	13.91	15.18	4.970	0.898
2004-05	12.89	15.73	4.710	0.824
2005-06	12.62	14.91	4.323	0.548
2006-07	11.79	15.14	3.955	0.593

2007-08	11.06	11.34	3.737	0.701
2008-09	11.71	14.72	3.565	0.532
2009-10	11.38	12.60	3.394	0.518
2010-11	11.01	9.06	3.153	0.415
2011-12	11.13	10.22	2.992	0.360
2012-13	9.15	9.38	3.329	0.383

Table 3: Development of the model for Different particulars.

S. No.	Particulars	Model	R^2	Significance of Model
Model 1	Kabirdham	Area =8.828+2.669 Production	0.80	0.0001
Model 2	Chhattisgarh	Area =93.140+2.350 Production	0.76	0.0001
Model 3	Total Cereal	Area =4174.60 -0.016Production	0.41	0.1199
Model 4	Percent contribution in Chhattisgarh	Area (%) =6.410 +0.423Production (%)	0.85	0.0001
Model 5	Percent contribution in Total Cereal	Area (%) =2.451+2.427Production (%)	0.93	0.0001

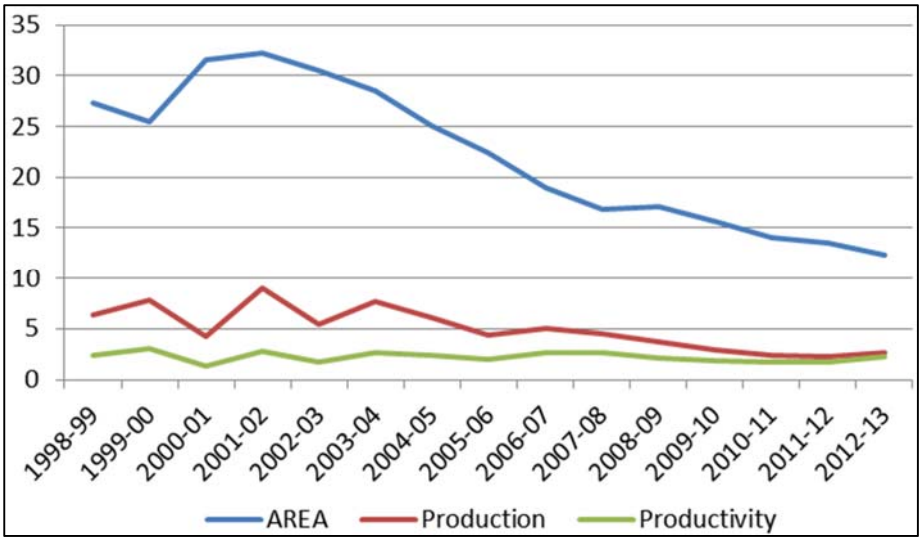

Fig 1: A, P and Pr of Kabirdham smaller millets

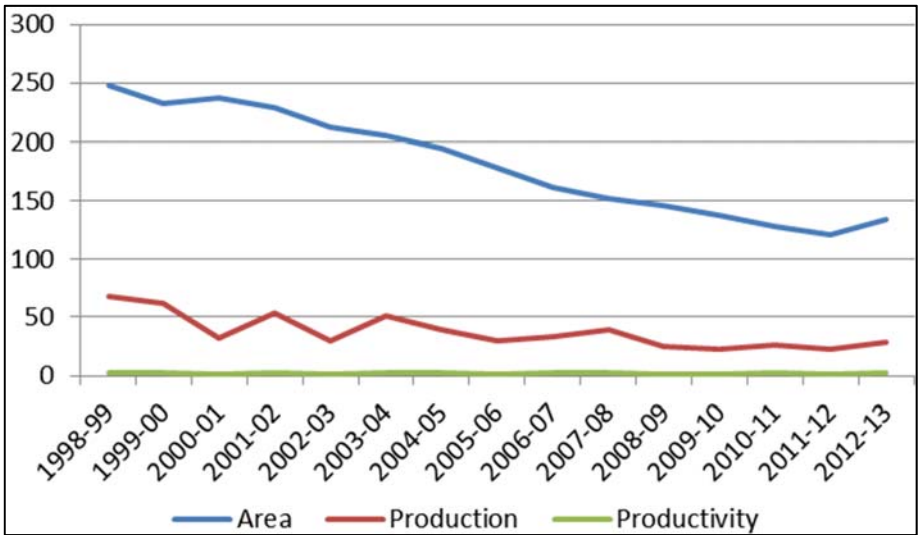

Fig 2: A, P and Pr of Chhattisgarh of smaller millets

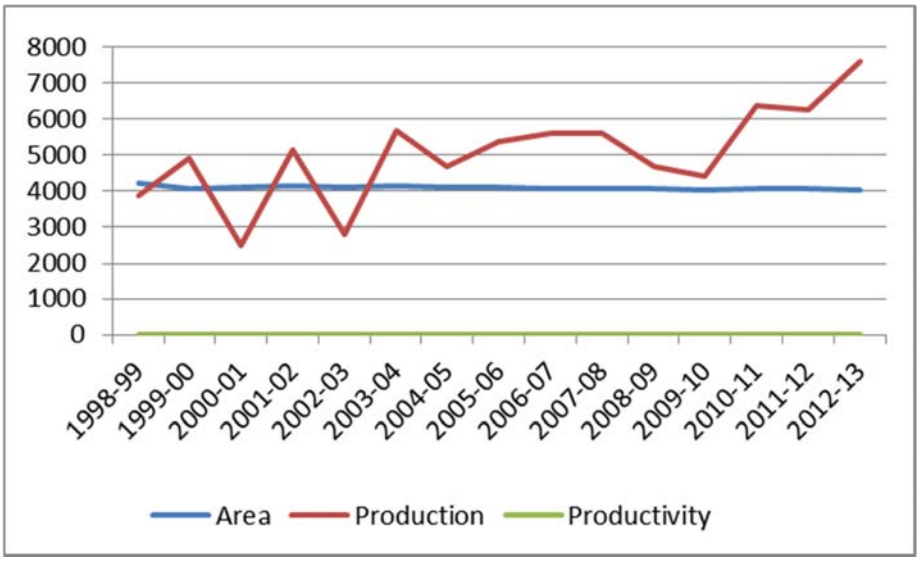

Fig 3: A, P and Pr of Chhattisgarh of Total Cereal

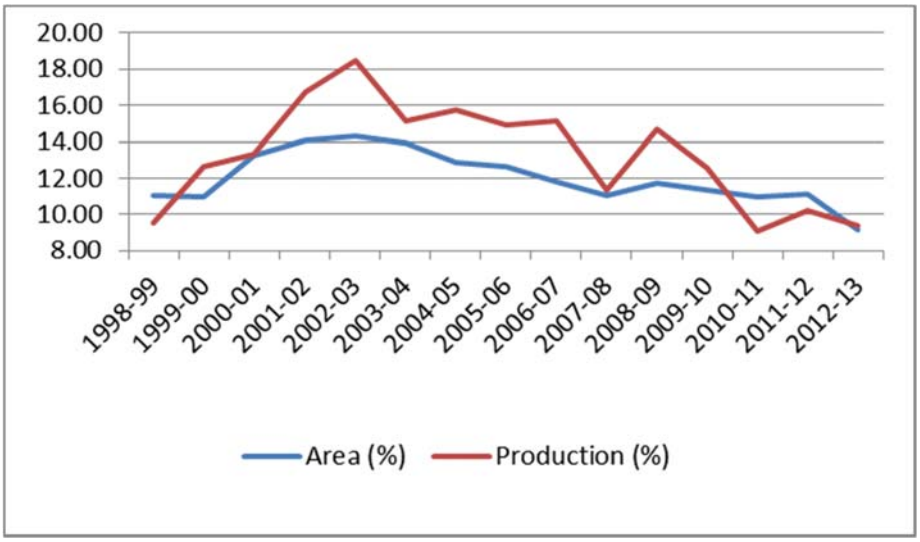

Fig 3: Percent Contribution of A and P of Kabirdham District with respect to Chhattisgah State

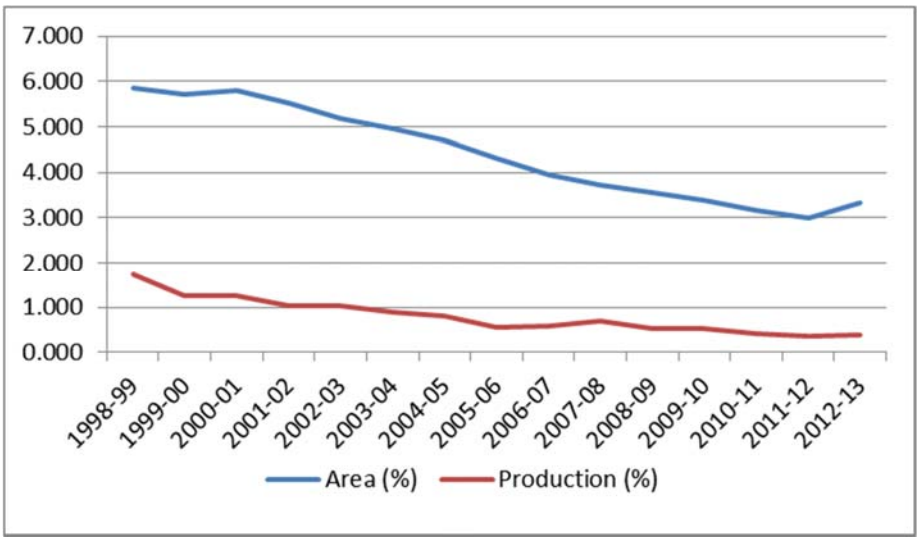

Fig 3: Percent Contribution of A and P of Kabirdham District with respect to Chhattisgah State
A= Area
P= Production
Pr= Productivity

References

1. Antony U, Sripriya G, Chandra TS. Effect of fermentation on the primary nutrients in finger millet (Eleusine coracana). J. Agric. Food Chem. 1996; 44:2616-2618.
2. Gopalan C, Rama Sastry BV, Balasubramanian SC. Revised by Narasinga Rao, B.S., Deosthale, Y.G. and Pant, K.C. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India Re-printed, 1989-2004.
3. Heuzé V, Tran G, Giger-Reverdin S. Scrobic (Paspalum scrobiculatum) forage and grain. Feedipedia.org. 2012. http://www.feedipedia.org/node/401.
4. Kodomillet. United States Department of Agriculture, 2013. No date given, accessed November 11, http://plants.usda.gov/core/profile?symbol=Pasc6.
5. Kodo millet. International Crop Research Institute for the Semi-Arid Tropics, 2013. (December 4, http://www.icrisat.org/crop-kodomillet.htm
6. Millets. Future of Food & Farming. Millet Network of India. (No date given, accessed November 13th 2013.) http://www.swaraj.org/shikshantar/millets.pdf
7. Nutritional Security of India National Academy of Agricultural Sciences, New Delhi, Policy Paper 66 December, 2013, 1-2.
8. Pearson Karl (June 20, Notes on regression and inheritance in the case of two parents, Proceedings of the Royal Society of London, 1895; 58:240-242.
9. Role of Millets in Nutritional Security of India National Academy of Agricultural Sciences, New Delhi, Policy Paper 66 December, 2013, 1-2.
10. Trend and Stability analysis of millet yields treated with fertilizers and crop residue in the Sahel, 2001.