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Short communication

Relative importance of biotic and physiological factors on mango production under Doon valley conditions of Uttarakhand

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ABSTRACT

A survey was carried out during 2009-2010 in three blocks of Deheradun to study the growers perception on major biotic and physiological factors confronting mango cultivation. Major constraints as perceived by 52 farmers through Garret Ranking Technique, pests scored 356.8 followed by physiological disorders (299.8) and diseases (283.35). These factors were ranked I, II & III major constraints in mango cultivation in the region, which can be tackled scientifically to raise productivity.

Key words: Mango, biotic factors, physiological disorders, production.

Mango (*Mangifera indica* L.) is known as the 'National fruit' of India. The country is endowed with rich cultivars wealth in India and it is the largest producer of mango in the world, but the productivity is still very low. This may be due to varied climatic conditions and different biotic factors and physiological disorders. In sub-tropical valley conditions of Uttarakhand, commercial cultivars of mango, *viz*., Dashehari, Langra and Chausa are predominantly cultivated in most of the orchards. Production, quality and thereby marketability of mango suffer from several limiting factors like pests and diseases (Shukla and Misra, 8; Saran and Kumar, 6) and also physiological disorders (Ram, 4; Saran and Kumar, 7) at all stages of fruit development. Therefore, efficient integrated crop management has now become an important activity of fruit production technology for achieving optimum yield and better fruit quality. Keeping above facts in mind, the present survey was conducted in agro-climatic conditions of Doon Valley, Uttarakhand.

The survey was carried out during the year 2009-2010 in three blocks of district Dehradun, *viz*., Vikasnagar, Kalsi and Sahaspur. A list of orchardists, predominantly involved in mango cultivation was prepared from these blocks. A total of 52 progressive growers were selected as the sample population. The detailed information required for the study was collected on various parameters through well-structured and pre-tested questionnaire. To identify the major constraints faced by growers, Garret Ranking Technique (GRT) was used. This technique was helpful in deciding the most important constraints faced by the respondents in the order of priority. GRT was used to rank the choice of factors or reasons. According to this, the respondents were asked to assign rank to different constraints with respects to their importance in the production process. The order of merit thus given by the respondents was converted into ranks by using the formula suggested by Garrett (1).

The per cent position of each rank was thus converted into scores by referring table given by Garret. Then, for each problem, the score of individual respondents were added and divided by the total number of respondents. The mean score for all the constraints were arranged in descending order to obtain the rankings.

To measure the degree of constraints as experienced by the respondents in relation to mango cultivation, the respondents were asked to indicate on a four point continuum (0-3) about the extent to which each constraint was perceived as crucial factor (Ray and Chowdhury, 5) in mango cultivation. The scoring procedure used was as under.

S. No.	Category	Score
1	High	3
2	Medium	2
3	Low	1
4	Not at all	0

The constraints faced by the mango growers were ranked in the order of merit according to the opinion of the respondents as per the GRT and the results have been presented in Table 1. Among the pest constraints, growers ranked the mango hopper as I (mean score 71.85%) followed by shoot gall maker (II, 67.94%). The other pests like fruit flies (55.25%), shoot borer (33.54%), termite (30.75%), gall midges

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(25.83%) and stem borer (24%) ranked III, IV, V, VI, VII, respectively.

The major diseases occurance under Doon valley due to specific climatic conditions were studied and ranked. Among the various diseases, powdery mildew ranked I (mean score 74.96%) followed by diesback ranked II (52.83%), gummosis ranked III (46.87%), sooty mould ranked IV (36.60%), rust ranked V (30%), while anthracnose ranked VI (26.31%) (Table 1).

Among the physiological disorders, alternate bearing ranked I (mean score 70.79%) followed by mango malformation (II, 62.48%), internal necrosis (III, 44.50%), fruit cracking (IV, 41.23%) and black tip (V, 37.19%) (Table 1).

Table 1. Constraints faced by the mango growers of Doon valley in Uttarakhand.

Type of constraint	Mean score	Rank within a category	Overall rank
	Pests		
Shoot gall maker	67.94	II	IV
Mango hopper	71.85	I	II
Mealy bug	21.15	VIII	XX
Gall midges	25.83	VI	XVII
Stem borer	24.00	VII	XVIII
Fruit flies	55.25	III	VI
Termite	30.75	V	XIV
Shoot borer	33.54	IV	XIII
Fruit borers	2.81	XII	XXVI
Leaf/ bark eating caterpillar	3.58	XI	XXV
Fruit sucking moth	1.40	XIII	XXIX
Thrips	10.37	IX	XXIII
Weevils	2.81	XII	XXVI
Leaf miners/Webbers	5.10	X	XXIV
	Diseases		
Powdery mildew	74.96	I	I
Anthracnose	26.31	VI	XVI
Gummosis	46.87	III	VIII
Dieback	52.83	II	VII
Rust	30.00	V	XV
Sooty mould	36.60	IV	XII
Phoma blight	2.56	VIII	XXVIII
Alternaria spot	1.20	IX	XXX
Bark scaling	12.02	VII	XXII
	Physiological disorders		
Internal necrosis	44.50	III	IX
Black tip	37.19	V	XI
Fruit cracking	41.23	IV	X
Burl (Woody gall)	16.88	VII	XXI
Spongy tissue	0.38	X	XXXII
Clustering	2.71	VIII	XXVII
Leaf scorching	22.62	VI	XIX
Alternate bearing	70.79	I	III
Mango malformation	62.48	II	V
Leaf chlorosis	1.02	IX	XXXI

Table 2. Distribution of various categories of constraints as perceived by the growers.

Type of constraint	Total rank score	Percentage	Rank position
Pests	356.38	37.93	I
Physiological disorders	299.80	31.91	II
Diseases	283.35	30.16	III
Total	939.53	100	

According to overall response perceived by the respondents, among all the biotic constraints and physiological disorders, powdery mildew, mango hopper, alternate bearing, shoot gall maker and mango malformation ranked I, II, III, IV and V, respectively. These constraints are common in various mango growing regions of India as also reported by Majumder and Sinha (2), Shukla and Misra (8), Saran and Kumar (7), and Singh *et al*. (9).

Overall category-wise constraints indicated by the growers regarding pests, diseases and physiological disorders have been presented in Table 2. Among the three different categories of constraints, pests scored 356.38 followed by physiological disorders (299.80) and diseases (283.35) with I, II and III ranks, respectively. The results revealed that these major constraints affected the mango production resulted into lower income to orchardists in Doon valley area of Uttarakhand. Constraints as perceived by the respondents in adoption of recommended guava production technology was reported earlier by Meena and Sisodia (3). However, biotic stresses and physiological disorders in mango cultivation have been studied and ranked for the first time in India under this region.

The present survey indicated that pest constraints were most important followed by physiological disorders and diseases under Doon valley conditions. Overall the powdery mildew, mango hopper, alternate bearing, shoot gall maker and malformation are the major constraints faced by the respondents. Nevertheless, these biotic and physiological constraints have become serious issue in mango cultivation. Further, studies are warranted for timely management of these constraints using integrated crop management practices to provide better returns to the mango growers.

It may be concluded that among all the biotic stresses and physiological disorders, powdery mildew, mango hopper, alternate bearing, shoot gall maker and mango malformation ranked I, II, III, IV and V, respectively. Among the three different categories of constraints, pests constraints scored 356.38 followed by physiological disorders (299.80) and diseases (283.35) with I, II and III rank, respectively. The results revealed that these major constraints if not managed efficiently, resulted into low orchard productivity thereby affecting the income of orchardists adversly cause high economic loss in mango production in Doon valley of Uttarakhand. Therefore, the paper attempts to rank the biotic stresses and physiological disorders as per their importance as perceived by the orchardists.

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