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Yield Reduction Index Method to Isolate Pest Resistant Varieties of Cotton (*Gossypium hirsutum*, L.)

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ABSTRACT

Yield reduction index (YRI) as a short-cut-method for the isolation of pest resistant varieties of cotton (*Gossypium hirsutum*, L.) was set up as the percentage reduction of yield of seed cotton under full plant protection of the seed cotton yield under non-protected condition. YRI close to zero indicates resistant variety while high value indicates the excessive susceptibility of a variety. In this study yield reduction index (YRI) varied from 0.338 to 0.651 in early and 0.105 to 0.482 in late group respectively. Early group with closer spacing showed high mean YRI (0.519) as compared to YRI (0.292) for late group with wider spacing indicating that the early varieties are relatively more susceptible to insect disease complex than the late group.

INTRODUCTION

Pest resistant variety is not only useful to cut down the cost on plant protection measures (PPM) but also insures stability of yield of seed cotton under neglected plant protection measures. Deviraj shows such fluctuations in yield. It gives optimum yield only if protected against aphids, thrips and bollworm (Patel, 1975), but its yield reduces drastically under neglected plant protection measures. It is, therefore, necessary to isolate a high yielding resistant variety. Since selection for resistance to several pests and diseases imposes limitation on genetic advance for multiple resistance, an indirect method such as yield reduction index provides a relatively easy selection criteria.

MATERIALS AND METHODS

To illustrate the procedure for isolating a variety resistant to pests on the basis of yield reduction index value (YRI), the data collected from coordinated varietal trials (early and late group) of *Gossypium hirsutum*, L. conducted at Agricultural Research Station, Talod (Gujarat) were utilized. The spacing of 0·9 m × 0·6 m and 1·2 m × 0·6 m were kept in early and late group respectively. The seed cotton yield (kg/ha) of all the varieties were recorded both under full plant protection measures (FPPM) and no plant protection measures (NPPM). Following formula was set up to workout YRI values for all the varieties in this study.

TABLE 1

Yield reduction index value of some varieties in *G. hirsutum*, L.

Strain	Yield of seed cotton (kg/ha)		YRI
	FPPM	NPPM	Value
Early group:— (0·9 m × 0·6 m specing)			
B–147 (Maharashtra)	1504	603	0·599
B–1007 (,,)	1165	483	0·585
A–51–9 (M.P.)	1362	901	0·338
A–56–347 ,,	1149	401	0·651
A–59–1684 ,,	1315	648	0·507
IAN–10 (199) (Gujarat)	915	350	0·617
IAN–560 (,,)	1162	697	0·400
Gujarat–67 (Control)	1858	929	0·500
Mean	1304	627	0·519
Late group:— (1·2 m × 0·6 m specing)			
A–218 (Punjab)	1462	1111	0·240
A–231 (,,)	926	586	0·367
815–3–1 (Tamilnadu)	1229	1018	0·171
MCU–1 (,,)	1754	1171	0·332
5110 (Mysore)	1319	876	0·335
SC–8–126 (Gujarat)	1724	1258	0·270
SC–4–102 (,,)	1654	1222	0·261
KD–170 (,,)	1843	1648	0·105
Deviraj (,,)	1903	984	0·482
Gujarat–67 (Control)	1860	1228	0·340
Mean	1567	1110	0·292

FPPM = Full plant protection measures, NPPM = No plant protection measures, YRI = Yield reduction index.

$$YRI = \frac{FPPM\text{-}NPPM}{FPPM}$$

Where, YRI = yield reduction index value

FPPM = yield of seed cotton in kg/ha under full plant protection measures.

NPPM = yield of seed cotton in kg/ha under no plant protection measures.

A cotton variety is said to be completely resistant to pests when it would record zero YRI value. As pest susceptibility of a variety increased, value of YRI would also increase simultaneously. In other words seed cotton yield of pest resistant variety would fluctuate less when plant protection measures were not adapted.

RESULTS AND DISCUSSION

The general yield levels under full plant protection measures (FPPM) and no plant protection measures (NPPM) were satisfactory under sandy soils of Agricultural Research Station, Talod (Gujarat) during the year 1968-69.

It was observed that the YRI value ranged from 0·338 of A-51-9 to 0·651 of A-56-347 in early group as against 0·500 of Gujarat-67 (control). Only two varieties viz. A-51-9 and IAN-560 were observed to be less susceptible to pests as compared to control.

In late group, YRI value ranged from 0·105 of KD 170 to 0·482 of Deviraj as against 0·340 of Gujarat-67 (control). Seven varieties viz. A-218, 815-3-1, MCU-1, 5110, SC 8-126, SC 4-102 and KD-170 were observed to be less susceptible to pests as compared to control. Deviraj variety which is under cultivation in Gujarat State showed maximum reduction in yield when plant protection measures were not given in late group, in this study. Patel (1975) also observed similar results.

It is interesting to note that the YRI value of Gujarat-67 was 0·500 under closer spacing, as compared to 0·340 under wider spacing. The over all YRI under closer spacing was higher than the YRI under wider spacing. It is attri-

buted to more favourable micro-environment under closer spacing which was more conginial for the development of pest complex.

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REFERENCE

Patel, G. A. 1975. Gujarat's Agriculture, Overseas Book Traders, Ahmedabad. P. 69.