

Screening for Resistance Sources in Local and Exotic Hot Pepper Genotypes to Fusarium Wilt (*Fusarium oxysporium*) and Associated Quality Traits in Ethiopia

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pepper accessions available in Ethiopia and exotic germplasm introduced from different sources. Thus, the objective of this study was, to screen exotic and local genotypes for resistance to *Fusarium* wilt and quality traits (capsaicin and oleoresin contents) and come up with potential parents that could be used in the future improvement program.

Field survey was carried out during the 2015 cropping season in the major pepper growing areas in the central rift valley of Ethiopia. The major hot-pepper producing areas such as Hawasa, Butajira, Koka, Ziway, Bishofu and Wonji were purposely selected. Farm fields at each selected area were systematically sampled to collect disease specimens. Following all accessible roads, every hot pepper farm was selected and assessed. Highly infected pepper plants showing typical wilting symptoms (leaf yellowing and dropping and/or partial or complete plant wilting) were collected for isolation and identification of *F. oxysporium*.

The disease severity index (DSI) was calculated according to the formula given by Galanihe et al. [8].

$$\text{DSI (\%)} = \frac{\sum (P \times Q)}{M \times N} \times 100$$

Where P=severity score, Q=number of infected plants having the same score; M=Total number of plants observed, N=Maximum rating scale number.

18	Acc-18	0.93(1.21)	HS	0.93(1.20)	HS	45	Acc-45	0.38(0.39)	S	0.23(0.23)
19	Acc-19	0.35(0.36)	S	0.20(0.21)	MR	46	Acc-46	0.20(0.21)	MR	0.08(0.09)
20	Acc-20	0.76(0.87)	HS	0.60(0.65)	HS	47	Acc-47	0.37(0.38)	S	0.22(0.22)
21	Acc-21	0.84(1.02)	HS	0.84(1.10)	HS	48	Acc-48	0.81(0.95)	HS	0.81(0.95)
22	Acc-22	0.86(1.04)	HS	0.86(1.04)	HS	49	Acc-49	0.25(0.25)	MS	0.10(0.11)
23	Acc-23	0.94(1.22)	HS	0.94(1.22)	HS	50	ICPN-916	0.26(0.27)	MS	0.10(0.11)
24	Acc-24	0.95(1.25)	HS	0.95(1.25)	HS	51	Melka Shote	0.26(0.27)	MS	0.10(0.11)
25	Acc-25	0.46(0.48)	S	0.28(0.28)	MS	52	Melka awaz	0.20(0.20)	MR	0.08(0.09)
26	Acc-26	0.83(0.99)	HS	0.66(0.73)	HS	53	Melka zala	0.14(0.14)	MR	0.06(0.05)
27	Acc-27	0.78(0.89)	HS	0.61(0.67)	HS	54	PBC-731	0.08(0.08)	R	0.02(0.02)
Mean	0.56		0.45				0.56		0.45	
CV (%)	33		35				33		35	
LSD (0.05)	0.6		0.7				0.6		0.7	

Table 1: Mean diseases incidence and severity index along with resistance levels of 54 hot pepper genotypes to *Fusarium* wilt evaluated at MARC in, 2015/16 Numbers in parenthesis are transformed values. R=resistance level, HR=highly resistant, R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, HS=highly susceptible, CV

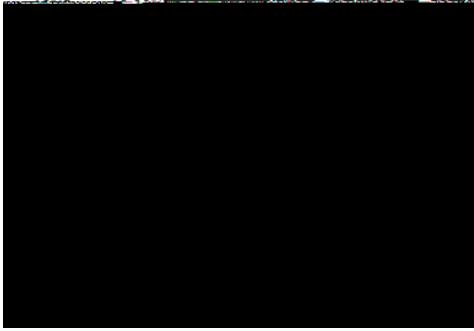


Figure 2 Proportion of 54 hot pepper genotypes in different resistance level to fusarium wilt disease as categorized from

Acc-2	3	1.9	1.6	91184	228	0.4	63949
Acc-3	3	1.8	1.7	70192	175	0.27	43663
Acc-4	2.9	1.9	1.5	118408	296	0.46	73319
Acc-5	3	1.7	1.7	110044	275	0.35	55642
Acc-6	2.4	1.4	1.7	99548	250	0.4	64239
Acc-7	2.6	1.5	1.7	101024	253	0.45	71967
Acc-8	2.7	1.7	1.6	55268	138	0.37	58926
Acc-9	3.2	2.1	1.5	98564	246	0.46	74479
Acc-10	2.8	1.7	1.7	61172	153	0.21	33327
Acc-11	3.1	2	1.6	73308	183	0.34	54193
Acc-12	2.9	1.7	1.6	60352	151	0.29	47141
Acc-13	3	1.9	1.6	65108	163	0.22	35645
Acc-14	2.4	1.4	1.7	39688	99	0.22	34873
Acc-15	2.7	1.6	1.7	72816	182	0.31	49459
Acc-16	2.8	1.834873					

Acc-38	3.2	2	1.6	71012	178	0.26	41635
Acc-39	2.9	2	1.5	118408	296	0.54	87423
Acc-40	3.3	2	1.6	87904	220	0.36	57960
Acc-41	3.2	2.1	1.5	58876	147	0.25	40186
Acc-42	2.8	1.7	1.6	39852	100	0.22	36128
Acc-43	2.9	1.7	1.8	33292	83	0.3	47914
Acc-44	3						

Acc-31 gave high color quality of greater than 250 ASTA unit. However; Acc-17, 28 and 43 gave the lowest values, in color content as well as in ASTA value as opposed to the highest values found in Acc-39, Acc-24, Acc-9, Acc-5, Acc-7 and Acc-4.

The color values recorded in this study are within the ranges reported by Kim et al., Topuz and Ozdemir and Howard et al. [15-17] for *C. annuum* cultivars. Similar to this study, Zaki et al. [18] reported maximum color value of (116160 cu) and extractable color of 294.38 ASTA value from pepper. Moreover; Lannes et al. [19] showed a variation of extractable color from 173-213 ASTA value, Dhali et al. [20] reported the values within the range of this study 82-190 and 85-1780 ASTA respectively.

Based on heat unit all the peppers accessions classified as highly pungent 25-70000 SHU and very highly pungent as the Scoville Heat Unit (SHU) values exceed 70,000. However; two accessions with high capsaicin and oleoresin content "Acc-24 and 39" can serve as potential sources of gene for both capsaicin production and oleoresin production. In line with this study, Kumar et al. [21] reported a range of capsaicin 0.33-0.49% percent.

However; as opposed to the current study, Deepa et al. [22] reported the highest range of 12.04-17.08% capsaicin content. The two accessions which gave the highest color value Acc-24 and 39 also showed relatively higher capsaicin content and hence according to Dhali and Hundai [20] further breeding program should be undertaken in order to lower the capsaicin content of these high color varieties. As the above analysis indicated, all the accessions which gave high oleoresin were with the exception of Acc-24 and 39 are within the preferable pungency limit of (0.2-0.5%) and could directly be recommended for high oleoresin production content. In this study

