PERFORMANCE AND IMPROVEMENT OF YIELD AND BULB QUALITY OF SOME ONION GENOTYPES

By

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ABSTRACT

This study was conducted during 2015 to 2017 at El-Giza Research Station, Field Crops Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. Fifteen onion genotypes were evaluated in two field experiments conducted with all recommended cultural practices and insectsides. In the first experiment, protective and systemic recommended fungicides against downy mildew were used, while the second was conducted without spraying fungicides against downy mildew. Randomized complete block design with three replicates was used in both experiments. Studied characters were disease severity (DS%) for downy mildew, total yield (TY), marketable yield (MY), average bulb weight (ABW), number of complete rings (NCR), number of growing centers (NGC), total soluble solids (TSS%) and bulb dry matter percentage (BDM%). Genotypes Yellow Creole, Ori Yellow, Composite 16 Large Oblong, Giza Red and Giza 6 Mohassan recorded low DS% under both control and no control of downy mildew which reflect their adaptability and stability performance under different environments. Under both control and no control of downy mildew, superior genotype were Giza White, Composite 16 White, Composite 9 Globe, Giza Red and Giza 6 Mohassan in TY; Giza 6 Mohassan and Ori Yellow in MY; and Ori Yellow, Giza 6 Mohassan, Composite 16 Large Oblong and Yellow Creole in ABW. Genotypes Beth Alpha, Texas Early Yellow Grano, Yellow Creole and Composite 9 Globe were higher in NCR and exhibited the lowest NGC per bulb under control and no control conditions of downy mildew disease. Genotypes Harla White, Deko White, Composite 16 White and Giza White showed superiority in TSS% and BDM% under both control and no control conditions of downy mildew disease. Genetic parameters, viz., genotypic (GCV%), phenotypic (PCV%) coefficients, broad sense heritability (h^2_{bs}), genetic advance (GA) and genetic advance as percentage of mean (GAM%) were estimated. Estimates of PCV were medium for TY, MY, ABW, NGC, TSS and DM, and high for DS%. Estimates of GCV were medium for TY, MY, ABW, NGC, TSS% and DM%, and high for DS%. Most of the studied traits showed low estimates of GA and high estimates of GAM% and h^2_{bs}. One selection cycle was carried out to select bulbs of cvs Giza White and Giza 20 with high TSS% (H-TSS-P_1), low TSS% (L-TSS-P_1) and bulbs with SGC (SGC-P_1) to improve their internal bulb quality. Progenies of the three selected populations were evaluated along with original population (O-P_0) in RCBD with three replicates. In cv. Giza White, one selection cycle increased TSS% from 14.6% in P_0 to 15.5% in H-TSS -P_1, decreased NGC from 2.18 in P_0 to 1.9 in SGC-P_1 and decreased TSS from 14.6% in P_0 to 14.08% in L-TSS-P_1. In cv. Giza 20, one selection cycle increased TSS% from 13.6% in P_0 to 15.4% in H-TSS-P_1, decreased NGC from 2.2 in P_0 to 1.59 in SGC-P_1 and decreased TSS from 13.6% in P_0 to 10.1% in L-TSS-P_1.

Key words: Onion, *Allium cepa*, bulb quality, heritability, mass selection.

LIST OF ABBREVIATIONS

Average bulb weight	:	ABW
Broad sense heritability	:	BSH
Cultivars	:	cvs
Dry matter	:	DM
Genetic advance:	:	GA
Genetic advance as percentage of mean	:	GAM%
Genotypic coefficient of variation	:	GCV%
Heritability in broad sense	:	h^2_{bs}
High total soluble solids	:	H-TSS
Low total soluble solids	:	L-TSS
Marketable yield	:	MY
Number of growing centers	:	NGC
Original population	:	P_0
Phenotypic coefficient of variation	:	PCV%
Randomized complete block design	:	RCBD
Response to selection	:	R
Realized heritability	:	h^2
Selected population	:	P_s
Selection differential	:	S
Single center	:	S-C
Single growing center	:	SGC
The progeny of selected population	:	P_1
Total soluble solids	:	TSS
Total yield	:	TY
Weight loss	:	WL

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