Genetic evaluation of some economic characters in onion (allium cepa l.)

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The present work was conducted in the Horticultural Department, TexasA&M University, Texas, USA through Channel System with Agricultural BotanyDepartment, Genetics Branch, Faculty of Agriculture, Zagazig University, BanhaBranch as an attempt to produce haploid onion plants (n) through anther andovary culture techniques. Effects of some factors and their combinations andmodifications were studied for haploid induction.The two onion genotypes used in this study were TGY1015 and 1025 weretaken from Texas A&M University farm to find out their ability to produce haploid plants through androgenic and parthenogenic techniques using two types of media; MS medium (Murashige and Skoog, 1962) and B5 medium (Gamborget al., 1968). Before culturing anthers or ovaries, they were exposed to coldtemperature pretreatment at 4°C for different periods. Also, three sucroseconcentrations were applied at different ages of cultured anthers and ovaries. a. Induction of Haploid Plants through Anther Culture in Onion (Allium cepaThe anthers of the two onion genotypes used in the present study did not respond to any factor, factor combination or modification. Accordingly, nohaploid plantlets were obtained from onion anther culture technique.b. Induction of Haploid Plants through Ovary Culture in Onion (Allium cepaL.)During the first 2 to 3 weeks, most of onion cultured ovaries swelled andturned to dark brown, then died. Simultaneously, the rest of the onion culturedovaries swelled at the base and turned into white. Eight to ten weeks later, ovary walls had split out and the plantlets started to emerge.Eight to ten more weeks later, the emerging plantlets grew on a shootsuitable medium and increased in size, in spite of the remarkable low incidence of regeneration (about 0.43% haploid out of the actual initial number of the cultured onion ovaries).After four to five more months, haploid plantlets were transferred to amisttint over a sterile potting soil under the natural environmental conditions. Those expressed regular development concurrent with clear differences compared to the diploid ones (2n). Haploids were less in size and growth. Factors affecting in vitro ovary culture 1. GenotypeThe potential of the genotype 1025 was greater than that of 1015 inproducing haploid plantlets through ovary culture technique under all otherapplied treatments. 2. Ovary ageThe highest average number of regenerated plantlets was achievedwhen onion ovaries were excised from flowers three to five days beforeanthesis. The minimum average number of regenerated plantlets occurredwhen the onion ovaries were excised six to ten days before anthesis. Theseresults were recorded for both onion genotypes used in this study.3. Temperature pretreatmentThe exposure of unpollinated onion ovaries to 4°C for four days as acold temperature pretreatment proved to be the most favorable inproduction the highest number of regenerated plantlets, irrespeet ofgenotype and suaose application.4. Media typeMurashige and Skoog basal medium (MS) was better than that ofGamborg (B5) in increasing the response rate of the cultured onion ovariesfor development into haploid plantlets.5. Sucrose concentrationSucrose concentration of 10%, was significantly better than the 5% and15% in increasing the average number of survivals of regenerated plantletsfrom cultured onion ovaries.6. Interaction between sucrose concentration and genotypeIrrespect of sucrose concentration, genotype 1025 producedsignificantly more rehenerated plantlets than did 1015. At 5% or 15%sucrose, no significant difference was recorded in the average number ofsurvival regenerated plantlets derived from the cultured onion ovaries of thetwo genotypes used.7. Interaction between sucrose concentration and ovary ageAt the level 10% sucrose, the highest

number of the regeneratedplantlets was obtained when the onion ovaries were excised three to fivedays before anthesis from genotypes 1015 and 1025.8. Interaction between sucrose concentration and temperaturepretreatment A significant increase in the average number of onion cultured ovaries which differentiated into plantlets occurred when the unfertilized ovarieswere exposed to 4°C for 4 days as a temperature pretreatment in thepresence of 10% suaose. Insignificant inaease in the response of theonion cultured ovaries to be differentiated into haploid plantlets was recorded because of the combination effect.Findings of the present study show that maximum haploid production from ovaries had been achieved with the genotype 1025, 10% sucrose, temperaturepretreatment at 4°C for a period of four days, MS medium and ovary age ofthree to five days before anthesis.