CHAPTER 2

REVIEW OF LITERATURE

Melon (*Cucumis melo*) originated in Africa and Asia and has many wild relatives there (Shamel, 2013). The major changes made by plant breeders to the domesticated melon compared with wild relatives have been to add disease resistance, remove seed dormancy, increase fruit quality, increase fruit productivity, increase the size of the mesocarp (the edible portion of the fruit), reduce the frequency of defects and increase the sugar content (Burger *et al*., 2006). Melon was brought from Africa and Asia to Europe and from Europe to America, it is now cultivated throughout the world, where specific types have been bred for local use.

Melon classification according to Jeffrey (1990) may be listed as follows:
Kingdom: - *plants*
Phylum : - *spermatpphyta*
Division : - *angiosperma*
Class : - *Decotyledoneae*
Family : - *Cucurbitacea*
Genus : - *Cucumis*
Subgenus: - *Melo*
Species : - *Cucumis melo*
Species *Cucumis melo* contains several botanical varieties showed as follows according to Guiss *et al*., (1998):

- Cantalupensis group (*Cucumis melo* var. *Cantalupensis*). Includes cantaloupe muskmelon, and Persian melon. The fruit are oval or round, sutured or smooth, mostly netted, some slightly netted or none netted. The flesh is aromatic and is usually salmon or orange in color.
- Inodorus group (*Cucumis melo* var. *inodorus*). Includes winter melon, casaba, crenshow, honey dew, juan canary, and santa clause. The fruit are round or irregular, smooth or wrinkled, but not netted. The flesh is mostly green or whit, occasionally orange, and not aromatic.
- Flexuous group (*Cucumis melo* var. *flexuose*). Include the snake or serpent melon and the American cucumber. The fruits are quite long, thin, ribbed, and often curled irregularly.
- Conomon group (*Cucumis melo* var. *conomon*). Includes the oriental pickling melon. The fruit are smooth, cylindrical, and may be green, white or striped. The flesh is white and can taste either sweet or bland.
- Dudaim group (*Cucumis melo* var. *dudaim*). Includes mango melon, pomegranate melon, and Queen Anne's melon. The fruits are small, round to oval, and light green, yellow, or striped. The flesh is firm and yellowish-white in color.
- Momordica group (*Cucumis melo* var. *momordica*). Include the photo and snap melon. The fruits are oval or cylindrical with smooth skin that cracks as the fruit matures.
- Aegyptiacus group (*Cucumis melo* var. *aegyptiacus*) Includes sweet melon. The fruits weight was very large and has oval or oblong shape the flesh color was orange and has very good taste.

2.1 Inbreeding, Selection indices, heritability and genetic advance

2.1.1 Inbreeding

The improvement of crop species has been a fundamental human pursuit since cultivation began (Alisdair *et al*., 2006). *Cucumis melo* plants have been endured to the human selection and plant breeding effort, selection in melon has led to a considerable varietal improvement like modification of mean population, reduce the variability and reduce the range of the population in one direction (Robinson and Decker-Walter 1999). The cross-pollinated crops are highly heterozygous, inbreeding in cross-pollinated vegetable crops like onion and carrot lead to serve homogeneity with amount of inbreeding depression. However, crops like cucurbits show very less inbreeding depression, the principal methods by which new varieties of cross pollinated vegetable have originated may be classified, broadly, to in four groups *viz., (i)* introduction, *(ii)* mass selection, *(iii)* synthetic variety, and *(iv)* hybrid breeding (Fageria *et al.,* 2001). The mass selection is most popular and effective method to develop cross pollinated vegetable crops. In mass selection, a number of phenotypically superior plants are selected from the population then seeds from them are harvested in bulk to raise the next generation and generation after generation, the important traits may be developed, and the improvement occur rapidly in early selective generation but the enhancement become slow in the later selection generations (Olaniyi *et al*., 2011). Abd-El-Salam and Marie (2002), also Rasoul *et al.,*(2014) on their studies regarding melon showed that the selection was effective in improving fruit edible portion, placenta hardness, flesh thickness and netted degree and the original population become more homogenous but traits like plant length and average fruit number decreased by inbreeding. Antonio (2004) showed the same trend of observation but in squash, and after 4 selective generations, the same author reported that traits like fruit mean weight, fruit length, neck length, weight of 100 seeds, seeds number / fruit and seed yield / fruit were decreased with increasing homozygosis, evaluated through Wright's coefficient.

2.1.2 Selection indices

Plant breeders can usually express their aims in simple terms as yield or quality, which affect the economic net worth of their crops. To attain these aims, however, such measures of the traits are require to be involved and a system of weighting according to their phenotypic importance and their genetic variability and inter-relations. It was ;therefore, easy to measure the important characters. Hazel and Lush (1942) indicated that, when several traits affect the net worth of an organism, it is necessary to weight variations in those characteristics in the proper ratio if maximum progress from selection is to be obtained. A method for estimating optimum relative weights has been given by Smith (1936) and Hazel (1943) for various selection projects. Robinson *et al*., (1951) have suggested the procedures for estimating genotypic and phenotypic covariances required for the construction of a selection index.

Selection indices method aims to maximize advance in economic traits and effective in selection for several traits in the same time, selection index requires knowledge of *(i)* the genotypic and phenotypic variance, *(ii)* the genotypic and phenotypic covariance, and *(iv)* the economic weight for trait. The "economic" values may reflect the market situation, preferences (Magnussen, 1990). Numerous investigations were carried out on selection indices in plant breeding like Eagles and Frey (1974) on oat, Simonds and Walker (1986) on sugar cane, Lal and Singh (1997) on melon, Gomaa *et al*. (1999) on cotton, Daliya and Wilson, (2004) on eggplant, Rabie *et al*. (2004) on rice grain, Hussein *et al*., (2008) on rice, Mohammed and syed (2010) on sweet corn and Mohammed *et al*. (2014) on sugarcane. The authors reported that there was more success using selection index for increasing expected response to selection than direct selection of different traits in the same time.

2.1.3 Heritability

The most important object of the analysis of variance is to break total (phenotypic) variance into two portions: the variance among genotypes due to heredity and the remaining variance This portioning of total variance enables us to predict the degree to which the variability of a quantitative character is transmitted to the progeny of the selected individuals, this is called heritability. Heritability provides a measure of the effectiveness with which selection can be expected to exploit existing genetic variability of the population (Fageria *et al*., 2001). Hatem *et al*. (1997) found that heritability for fruit weight was moderate 45.16% , and this value may be indicates that average fruit weight affected by environmental conditions, but flesh thickness and fruit dry matter trait has high heritability 85.443% and 60.1 %respectively, and moderate heritability estimates in T.S.S. 50.1%. Abd-El-Salam and Marie, (2002) found that the traits as fruit weight, fruit shape index, flesh thickness have low heritability estimates this indicating that the response to selection would be slow and effective in late selection generations, the high heritability estimates were in traits T.S.S. 77%, total yield / plant 56% and number of fruits / plant 50% and intermediate in fruit diameter 49% and fruit length 35% indicated to a large of the genetic variance and low influence of the environment, suggested that selection based on early selection generations would be relatively effective. Parmer and Tarsem (2003) on melon, reported that the traits which have high heritability values with high genetic advance are the most suitable for further improvement through selection. The same authors observed high heritability and high genetic advance for number of fruits per vine and rind thickness. Rakhi and Rajamony (2005) found high heritability estimates for fruit length, fruit girth, 1000 seed weight, average fruit weight, keeping quality of fruit, flesh cavity ratio and yield / plant signifying that these characters are genetically controlled and there could be grater correspondence between phenotypes and breeding value while selecting individuals.

Chandrashekhar (2006) on cucumber found high heritability for traits, nod number which first female flower appears 90.9% with low values for GCV (12.76%) and PCV (13.48%); days to harvest the first fruit 89.4% with low GCV (4.72%) and PCV (5.05%); plant length 96% with low GCV (6.1%) and PCV (6.22%); number branches / plant 87.6% and medium GCV (34.04%) and PCV (36.37%); fruit length 93% and medium GCV (28.63) and PCV (29.69%); fruit diameter 88.89 and low GCV (19.48) and PCV (20.67); flesh thickness 89.% and moderate GCV (24.33%) and PCV (25.79) but the low heritability values were in days to the first female flower 43.1% with low GCV (3.41) and PCV (5.19%) and in number of unmarketable fruits / plant 45% with moderate GCV (24%) and PCV (35.68). Zalapa *et al*. (2006) on melon, found high heritability estimates for number primary branches, average fruit number / plant, average fruit weight / plant and total yield / plant were 91% , 80% , 79% and 89% , respectively . Regarding narrow sense heritability were 71% for primary branches number, 68% for fruit number per plant, 33% for fruit weight per plant and 6% for total yield / plant.

Chamnan and Kasem (2006) on melon, found high heritability for fruit width, length, shape index and weight, fruit no. / plant and total yield / plant (kg), and they reported that the high heritability indicating that the genetic variance was highly expressed in the phenotype and that superior genotype might be identified efficiently through the evaluation of phenotype. The breeding program for incorporation of these traits could be manageable and signified the high potential for improving these characters through breeding method. Gabriel and Todd (2007) on water melon, reported that heritability value of fruit weight was low to intermediate. Iban *et al* ., (2007) on melon found that heritability estimates for fruit : weight , T.S.S. , diameter , length and shape index were 19% , 35% , 31% , 29% and 62% respectively. Pornsuriya. (2009) on oriental pickling melon showed that the estimates of broad sense heritability for fruit: length, width and shape index were 65%, 55% and 88% respectively. Olaniyi *et al*, (2011) on melon, found high heritability for days to maturity, fruit weight, length of vine, number of branches / plant and no. of fruit / plant. Fatema *et al*. (2014) in snakegourd found high heritability values in days to the first male and female flower, nod no. of the first male and female flower , days to first fruit setting, nod no. of first fruit setting and no. of primary branches/ plant and stated that phenotypic selection for these characters would be reasonably effective.

2.1.4 genetic advance

High values of heritability associated with high genetic advance this means high additive gene effects and consequently the scope for improving yield through selection is more. Abd-El-Salam and Marie (2002) found that the genetic advance were in the favorable direction and was larger in the second selective generation than the first selective generation for number fruits / plant; average fruit weight; total yield / plant; fruit length and flesh fruit thickness traits, genetic advance in the first and second selective generations were identical for fruit shape index and approximated for TSS trait, from results of genetic advance a rapid progress in improvement of that trait, specially which explain high heritability is expected. Rakhi and Rajamony (2005) found high values of heritability associated with high genetic advance in fruit weight, 1000-seed weight and keeping quality of fruits. Fatema *et al* (2014) found high genetic advance for days to first female flower and node no. of fruit setting. Chamnan and Kasem (2006) on melon, found high genetic advance for fruit length and weight and fruit no. / plant and suggesting that improvement of this characters would be effective through phenotypic selection. Olaniyia *et al*. (2011) on Eguci melon, found high genetic advance over the mean for 100 seeds weight, fruit weight , length of vine no. of branches / plant, no. of fruit / plant, no. of seeds / fruit, seed weight / fruit and seed yield / plant. Ibrahim (2012) on sweet melon, found high heritability coupled with high genetic advance for fruit weight and yield / plant this provided that these parameters were under the control of additive genetic effects. This indicates that selection should lead to fast genetic improvement of the material. Fatema *et al*. (2014) found high genetic advance for days to first female flower and nod no. of first fruit setting.

2.2 Correlation coefficient and path-analysis

2.2.1 Correlation coefficient

Correlation between two traits may exist when there is a variation within each character and when the two traits vary together toward a positive or negative direction. This may be due to either a peleiotropic effect of a gene on different parts of the plant or to linkage. This relationship is expressed by the correlation coefficient. The correlation between the different traits in melon is an important aspect which should be utilized for better planning of selection program (Hatem *et al*., 1996). The previous authors also, found significant positive correlation between early yield with each of the following: number of fruits /plant, total fruit number and total fruit weight / plant they concluded that selection for any one character may result in progress for other positively correlated characters. Gomez-Guillamon *et al*. (1985) found high significant correlation between fruit with each of the: weight length, and diameter of melon, Also, they detected good relations between fruit diameter with each of the following: seed cavity diameter and flesh thickness. The same authors suggested that it could be possible to obtain a simplified characterization using the weight and fruit length. In another study, Dhaliwal *et al*. (1996) found such associations among flesh thickness, fruit weight and yield. Abd-El-Salam and Marie (2002) found positive and significant correlation between total yield / plant with each of the: number of fruit / plant, fruit weight and T.S.S.; fruit length and flesh thickness. So, they suggested that selection should be practiced for high yielding sweetness and fruit thickness based on number of fruits, fruit weight and fruit length They also reported positive correlation between fruit weight and fruit diameter. The same authors found a negative correlation between fruit weight and number of fruits / plant indicating that fruit weight will be decreased with increasing number of fruits / plant. Taha *et al*., (2003) on melon, recorded a significant positive correlation between yield / plant and primary branches; earliness and flavor; netting development and TSS; flavor and earliness; plant length and fruit weight; primary branches with each of the: yield / plant, netting development, secondary branches; secondary branches with each of the: flavor, primary branches; cavity diameter and netting development; fruit weight and plant length. They also found negative correlation between earliness and TSS; plant length and primary branches; cavity diameter and secondary branches. They reported that the information on the correlation and linkage among different horticultural characteristics is of primary importance in the field of crop improvement and linkage relationships can be used to increase breeding efficiency by allowing earlier selection and reducing plant population size during selection. Wahba (2004) found significant positive correlation between flesh thickness and fruit diameter; cavity diameter and fruit length; fruit weight with each of the: fruit length, fruit diameter and cavity diameter, whereas significant negative correlation was found between flesh thickness and fruit length.

Singh and Lal (2005) mentioned that fruit weight, flesh thickness and vine length had a significant positive correlation with marketable yield. Chamnan and Kasem (2006) on melon, found significant positive correlation between fruit weight and fruit length, fruit shape index and each of fruit length fruit weight, yield (kg) / plant and fruit no. / plant, in addition to a significant negative correlation between fruit length and fruit width. Reddy *et al*., (2007) found high positive correlation between fruit diameter and fruit cavity; yield / plant with each of the: fruit weight, plant length, flesh thickness, fruit length, fruit diameter, first female flower nod number , length of fruit cavity, ascorbic acid and maturity period. Number of fruits per plant showed a highly significant positive correlation with TSS and a highly significant negative correlation with each of the: fruit length, fruit weight, fruit diameter, flesh thickness, length of fruit cavity and total carotenoids. Feyzian *et al*. (2009) found significant positive correlation between fruit number / plant and total fruit weight; average fruit weight with each of the: maturity duration, average fruit length, average fruit width, flesh thickness and total fruit weight; maturity duration with each of the: average fruit length, average fruit width, flesh thickness and total fruit weight; average fruit length with each of the: average fruit width, shape index, flesh thickness and total fruit yield; average fruit width with each of the: flesh thickness and total fruit yield; flesh thickness and total fruit yield. While negative significant correlation between fruit number with each of the: average fruit weight, maturity duration, average fruit length, average fruit width, shape index, flesh thickness; average fruit width and shape index. Ibrahim and Ramadan (2013) on sweet melon found that yield / plant was positively and significantly correlated with fruit weight, flesh fruit thickness and fruit length. Dewan *et al*. (2014) on ash gourd, found significant positive correlation between average fruit weight (kg) and each of fruit length and diameter, and yield of plant (kg) with each of average fruit weight and vine length (m) at harvest.

2.2.2 Path coefficient analysis

Path coefficient analyses have been, widely, used in plant breeding to determine the nature of the relationships between yield and its contributing components and quality characters. Wright (1921) proposed a method called path analysis which portions the estimated correlation to direct and indirect effects. Dewey and Lu (1959) who carried out this analysis on plants. In melon, yield is correlated with several traits including days to anthesis number of fruits, average fruit weight, primary branches number, number of nods on the main stem, stem length, flesh thickness and shape index, and these traits make direct and indirect effects between them to affect yield. Rawhia (2004) found that the fruit length and flesh thickness seemed to have direct effect on fruit weight they gave partially equal values of both direct effect and correlation coefficient with fruit weight. So, selection through these two traits will be effective in improving fruit weight. The indirect effect of fruit diameter through flesh thickness and seed cavity diameter traits appeared to influence fruit weight. This was true for seed cavity diameter which affects fruit weight through its relation with fruit length and flesh thickness. The estimated value of the residual effects were too small, which means that the studied traits (fruit diameter, flesh thickness and seed cavity diameter) might be enough, as indices in the melon fruit weight selection. Singh and lal (2005) found that fruit weight, flesh thickness and vine length exhibited high positive direct effects on yield. The number of fruit / vine exerted a negative indirect effect through fruit weight. Days to first female flowering, however, had a negative direct effect as well as negative significant correlation with marketable yield. Thus fruit weight, flesh thickness and vine length could serve as important selection indices for remarkable yield. Wearers, a sacrifice in yield would be required for selection of earliness. Reddy *et al*. (2007) found that plant length had the maximum direct positive effect on yield / plant followed by non-reducing sugars and total carotenoids so direct selection for plant length would be good for yield improvement. Negative direct effects over yield were exhibited by fruit length, fruit diameter, first female flower node number. However, these traits had high positive indirect effects on yield via plant length. Therefore, indirect selection for these traits through plant length would be effective for yield improvement. The same trend was reported by Krishna and Singh (1992) on cucumber.

Abd-El-Rahman *et al*. (2011) studied direct and indirect effects of yield components on total fruit yield per plant in sweet melon. The direct effect of average fruit weight per plant was strongly positive (1.1168). Also, the direct effect of number of fruits per plant was positive (0.7112). So, it might indicate to a true relationship and the direct selection through these tow traits might be effective for improving total fruit yield of sweet melon. Indirect effects was by plant length throw its effects on average fruit weight (0.769) ,so, indirect selection for high plant length may be effective in improving total fruit yield through its relationship with average fruit weight / plant. Ibrahim and Ramadan (2013)on sweet melon, found direct positive effects for fruit weight, number of fruits / plant and stem length on total yield / plant, while maximum positive indirect effects on total yield / plant were exhibited by fruit length and flesh fruit thickness through fruit weight. Dewan *et al*. (2014) on ash gourd, found that the number of fruits / plant and average fruit weight directly contributed to the yield of ash gourd accessions and the flesh thickness indirectly effected yield. So, number of fruit / plant, average fruit weight, fruit length and vine length were the important characters for varietal selection of ash gourd.

2.3. Sensory attributes

Quality of melon fruits is determined by several external and internal features. Sensory attributes are considered of great importance in determining the fruit quality of melon. Radwan and Hassan (1984) reported that flavor and texture of some Egyptian sweet melon cultivars were pleasant and varied among different genotypes. Guerineau *et al*. (2000) found major changes in texture, odor and flavor in fruits of Charantaise melon compared with five reference cultivars. Robert and Gene (2009) on melon found that the consumers distinctly preferred the overall eating quality of melon pieces from hybrid fruit compared to those from male and female line fruit, and found also that the overall eating quality was most highly correlated with flavor acceptability (r=0.88**). Eating quality was also highly correlated with sensory scores for textural acceptability (r=0.79**), sweetness intensity (r=0.75**) and melon –like flavor intensity (r=0.73**). Sweetness intensity was correlated to flavor intensity (r=0.79**) and flavor acceptability (r=0.8**). And reported that these results suggest that flavor-related characteristics best predict consumer preferences overall eating quality, through textural quality also contributes. Many workers (Abak *et al*., 2000); Prado *et al*., 2002; Amy *et al*., 2003; Robert and Gene, 2009; Zehra *et al*., 2013) stated that fruits of F1 hybrids, among sweet melon cultivars, possessed grater orange color, flesh flavor and aroma than their parents and consumer prefer netted melon than non netted melon.

2.4. Heterosis, gene action and combining ability

Crossing of two, genetically, dissimilar plant is known as hybridization, when genetic variability is not present in the crop, hybridization may followed to generate the variability which is required for improvement of any crop and produce F1 hybrid which have three types of heterosis, heterosis over mid parents, heterosis over better parents and heterosis over commercial cultivar Fageria *et al*. (2001). The authors declared that the steps involved in hybrid seed production as follows:

1- Production of inbred lines (homozygous pure lines)
2- Testing combing ability (general combining ability and specific combining ability)
3- Production of hybrid seeds

Heterosis was first reported by Beal (1880), many investigations were conducted on heterosis and combining ability in melon among them Hatem (1992) who studied the F_1 hybrid of a diallel cross in melon and stated that earliness was controlled by additive genes. Hatem *et al*. (1995) found highly significant differences for general and specific combining abilities for all studied characters (early yield fruit number and weight, total fruit number and weight, dry matter of fruits, relative growth rate, net assimilation rate and leaf area ratio), and said that, these results indicated that genes with additive and non-additive effects are involved in the inheritance of these traits. Hatem *et al*. (1996) determined heterosis in melon, and found useful hybrid vigor in early yield as fruit weight, total fruit number, total fruit weight and dray matter of fruit in most of the crosses, and stated that this knowledge about the heterosis is helpful to plant breeder before planning a successful breeding program. Hatem *et al*. (1997) studied the mode of inheritance for average fruit weight, flesh-thickness, T.S.S. and fruit dry matter content, from results there were high heterosis over mid parents and high parent in average fruit weight and T.S.S. traits and dray matter content, fruit weight was controlled by more than two pairs of genes with mostly additive gene action and absence of dominance was observed. Furthermore, presence of many minor genes was required for the expression of the high average fruit weight. Flesh thickness, was controlled by two major gene pairs. Furthermore, the presences of many minor genes were required for expression of the thick flesh. Partial dominance for the high flesh-thickness with mostly additive gene action was observed. TSS was found to be controlled by more than sex pairs of gene with mostly additive gene action and partial dominance for the high content. Regarding the fruit dray matter, it showed partial dominance for the high content, and at least two pair of genes controls this character, with mostly additive gene action. Furthermore, the presences of many minor genes were required for the expression of the high fruit dry matter content.

Shamloul (2002) on sweet melon showed that the means of F_1 hybrids, significantly, exceeded the means of the mid-parents for all of the studied vegetative traits. These results are in agreement with that detected by Gaber (2003) on squash, indicated the presence of highly significant heterosis values over the mid-parents for all of the studied vegetative traits. Elshimi *et al*., (2003) studied the heterosis and gene action in some melon characters, plant height, number of internodes, plant growth rate, fruit number / plant, total yield / fed, fruit yield / plant, average fruit weight, T.S.S. and flesh thickness. Heterosis over mid-parent was observed for most of the studied characters. All of dominance degree appears, complete, partial and over dominance in all crosses under studied. The obtained results showed that variances due to specific combining ability were higher in magnitude than the variances of general combining ability for all studied traits. Dominant gene effects were controlling the economic characteristics of melon, except number of fruit / plant, this was governed by both dominant and additive gene effects.

Obiadalla-Ali (2006) on summer squash, showed that the majority of crosses exhibited significant heterosis estimates over mid and best parents for all studied traits, also results revealed that the general combining ability (GCA) and specific combining ability (SCA) mean squares were highly significant for all studied traits (earliness, vegetative and yield components traits). Elmighawry *et al*. (2008) found that additive and non-additive components made up the genetic variation and dominance components was larger in magnitude than additive one for setting ratio, number nodes to the first female flower, early yield / plant, number of fruits / plant, total yield / plant and fruit weight traits, and found that the most desirable general combining ability effects were shown by the local parental lines for early yield / plant and weight of 100 seed and from Eskandrani for the rest traits.

Hatem *et al*. (2009) found that the all types of dominance appeared (no dominant, partial dominance, complete dominant and heterosis). The obtained results showed that useful hybrid vigor was observed for all studied traits, comparisons of the hybrids with their respective high parents indicated heterosis in one cross in early yield as fruit number, three F1hybrid for early and total yield as fruit weight, two crosses for total yield as fruit number, one cross for average fruit weight and vitamin C and four crosses for TSS content, and found, also, that the high estimated values of heterosis and potence ratio were in accordance with the hybrid vigor concluded. Meanwhile, no hybrid vigor was observed concerning all traits for some crosses. Abd-El-Rahman *et al*, (2011) on melon found that the Heterosis over mid parents and high parent values and potence ratio were evident. The cross ananas el-doki x shahd el-doki showed high heterosis for average fruit weight and total fruit yield per plant. Most of the studied characters showed highly significant SCA variances, indicating that the non- additive gene effect is important in the inheritance of such characters. However, SCA mean squares were found to be greater in magnitude than that of GCA in all studied traits. The authors declared that this knowledge about the genetic of particular traits is helpful to plant breeder before planning a successful breeding program. Shamel (2013) on sweet melon found that the general combining ability was significant for all the studied characters except no. of branches per plant and no. of seed per fruit , and specific combining ability and reciprocal effects was significant for most studied characters. The results showed that general combining ability was higher than specific combining ability for no. of nodes pre first male flowering and fruit weight, it can be predicted for an additive gene action for this character

Rasoul *et al*, (2014) on Cantaloupe found that the additive genetic variance component was significant for average fruit weight, flowering date, dray matter and TSS, and the dominance genetic variance was significant for average fruit weight, total fruit yield / plant, dray matter and TSS. However, dominance × year interaction was significant for all traits under investigation except for TSS. Additive gene effects were most important with respect to average fruit weight, flowering date, dray matter and TSS, while genetic dominance effects mainly controlled total yield / plant.