Effect of Different Plastic Sheet Covering and Pruning Times on Soil and Air Temperature Monitoring, Vegetative Growth and Bud Behaviour of Table Grape "Superior Cv."

Aly, M. A.; Thanaa, M. Ezz. and A. M. Abou-Elmaaty
Fac. Agric., Saba Bacha, Plant Production Department,
Alex. Univ.

ABSTRACT

The present study was conducted during 2007 and 2008 seasons in a private vineyard of "Superior" grape cultivar at Mohamed Metwaly EL-Shaarawy village, El-Noubarya city, Behaira governorate, Egypt. Vines were pruned in different times (December 1st, 15th, and 30th) and covered by white, yellow plastic sheets (air and soil). Their effects on soil and air temperature monitoring, vegetative growth and bud behaviour were studied. Results revealed that, yellow sheet covering trees (YSCT) increased mean of maximum air temperatures by 7°C, followed by (WSCT) which increased by 5.5°C, also (YSCT) increased mean of minimum temperatures by 1.8°C followed by (WSCT) which increased by 1.2°C. Vegetative bud burst advanced 20 days by (P1YSCT) and (P1WSCT) but (P30YSCS) and (P30WSCS) delayed it 11 days as compared by control treatment, moreover, (P30YSCT) and (P30WSCT) gave the least period for vegetative bud burst 14 days but no differences were found under vines which treated with different sheet covering soil with different time pruning as compared by control (18 days). (P1YSCT) and (P1WSCT) advanced flower bud burst by 21 days but (P30YSCS) and (P30WSCS) delayed 10 days as compared with control treatment. (P30YSCT) gave the short period for flower bud burst, which decreased it by 3-4 days as compared with control treatment. Generally (P30WSCS) and (P30YSCS) gave a high number and percentage of bud burst but (P1YSCT) gave the lowest values compared with control treatment. The highest bud fertility % was obtained with control treatment, meanwhile treatments (P1YSCT) and (P1WSCT) produced the lowest bud fertility %. Also, the highest leaf area was obtained (P30YSCT) compared with all treatments moreover, the highest shoot length was observed with (P1YSCT) and (P1WSCT) treatments. The different pruning time with white sheet coverings trees gave the highest leaf total chlorophyll content.

INTRODUCTION

The grapevine is one of the most important fruit crops plants of the world. A grape is the fleshy, non-climacteric fruit that grows on the perennial and deciduous woody vines of the family *Vitaceae*. Plasticulture techniques use wavelength selective polyethylene mulch and clear polyethylene to tarp solar energy, raise soil and air temperatures, and thereby advance the harvest season of row crops (Wells and Loy, 1985; Bonnano and Lamont, 1987; Maurer and Frey, 1987; Gerber *et al.*, 1988; Motsenbocher and Bonano, 1989; Gaye *et al.*, 1992; Alexander and Clough, 1998; Bowen, 1998; and Jenni *et al.*, 1998). Row covers also shield plants from wind which can disturb leaf display (Bowen and Frey, 2002) and reduce stomatal conductance (Caldwell, 1970). Although enclosing whole vineyard blocks or rows in polyethylene film has been used successfully to advance table grape harvest (Novello *et al.*, 1999 & 2000). Timing of phonological stages and rates of growth and development in grapevines are strongly dependent on temperature exposure (Guitarez *et al.*, 1985 and Williams *et al.*, 1985). Covering a vineyard will modify the solar radiation characteristics (Carbonneau, 1984; Smart, 1985 and Reynolds *et al.*, 1996) and, consequently, creates changes in the microclimate (photosynthetically active radiation, air temperature, humidity and wind speed) at the cluster level. The modification of the vineyard microclimate has direct effect on the plant water status (During, 1987, Novello *et al.*, 1992; Katerji *et al.*, 1994 and Heilman *et al.*, 1996), on the gaseous exchanges (Trambouze and Voltz, 2001), on the response of the crop to soil water depletion (Winkel and Rambal, 1990), and has great impact on the grape yield and quality (Smart, 1985).

In addition to air temperature, it appears that root zone temperature independently influences budbreak timing. Increasing the root zone temperature of dormant cabernet sauvignon vines by 13°C (i.e., from 12° C to 25° C), while maintaining the same ambient air temperature, advanced budbreak by 5-11 days (Kliewer, 1975; Zelleke, and Kliewer 1980). Growth of young shoots and bloom date has been successfully predicted from degrees of temperature. Shoot growth can be also affected by root zone temperature (Zelleke and Kliewer, 1979). These dependencies suggest that increasing vine microclimate temperatures early in spring, when temperatures are coolest, may be the most effective avenue for accelerating vine development and advancing veraison and fruit maturation. Polyethylene enclosures constructed around large blocks of vines have been used successfully to trap solar energy and induce early budbreak and veraison of table grapes (Novello *et al.*, 1999 & 2000).

Pruning is an obvious management technique developed to regulate the balance between fruit production and vegetative growth of grapevines, also influenced bud behaviour and bud fertility (Salem *et al.*, 1997, Howell and Strieglar, 1998, Shahien *et al.*, 1998, Ali *et al.*, 2000 and Omar & Abdel-Kawi, 2000). Pruning severity is influenced by the bearing nature and physiology of such grape vine cultivar. It is also well demonstrated that Roumi, Flame and Rouby seedless are pruned to spur system, since their fruitful buds are located at the basal part of the canes.

The objectives of this study were to investigate the effects of different air and soil plastic sheet coverings and pruning times on air and soil temperature monitoring during the growth season, vegetative, flowering bud burst and some vegetative parameters.

MATERIALS AND METHODS

The present study was conducted during the two seasons of 2007 and 2008 in a private vineyard of "Superior" grape cultivar at Mohamed Metwaly EL-Shaarawy village, El-Noubarya city, Behaira governorate, Egypt. Two field practices were conducted in a split-plot design with four replicates in the two seasons. The vineyard was established in 2002, with vine spacing of 2 m within rows and 3 m between rows. The vines are grown in sandy soil under drip irrigation system and trained to cane pruning under baron trellis system.

The main factor was the three pruning times (1^{st} December, 15^{th} December and 30^{th} December) carried during dormant season to ten canes per vine with 12 nodes per cane. Four renewal spurs (2 nodes) were retained per vine, while the sub main factor was four mulching treatments with sheet cover sleeves (air clear plastic, air yellow plastic, land clear plastic and land yellow plastic) which were randomly arranged in the sub-plots (Table 1). The control is the field (no mulch with pruning 20^{th} December). The experiment included a 3X4 of pruning time and mulching treatments (two colors and two methods of application), which were applied in a split plot design, replicated in four blocks.

Vines and soil mulch application were applied 25 days after pruning time in all treatments in both seasons. Removal mulching was either all-at-once or in two stages to allow for vine acclimation (Bowen *et al.*, 2004a). All removal was before harvest 15 d, in the all treatments. All soil sleeves were constructed of 75 cm wide, length the row, clear and yellow polyethylene plastic. All air sleeves covered vegetative growth; the sleeve enclosures were supported at the top by trellis catch wires and closed at the bottom around the vine cane.

Combination treatments:

The following treatments were applied:

1- Pruning in 1st Dec. + White Sheet Cover Trees (P1WSCT).
2- Pruning in 15th Dec. + White Sheet Cover Trees (P15WSCT).
3- Pruning in 30th Dec. + White Sheet Cover Trees (P30WSCT).
4- Pruning in 1st Dec. + Yellow Sheet Cover Trees (P1YSCT).
5- Pruning in 15th Dec. + Yellow Sheet Cover Trees (P15YSCT).
6- Pruning in 30th Dec. + Yellow Sheet Cover Trees (P30YSCT).
7- Pruning in 1st Dec. + White Sheet Cover Soil (P1WSCS).
8- Pruning in 15th Dec. + White Sheet Cover Soil (P15WSCS).
9- Pruning in 30th Dec. + White Sheet Cover Soil (P30WSCS).
10- Pruning in 1st Dec. + Yellow Sheet Cover Soil (P1YSCS).
11- Pruning in 15th Dec. + Yellow Sheet Cover Soil (P15YSCS).
12- Pruning in 30th Dec. + Yellow Sheet Cover Soil (P30YSCS).
13- Control (Field Treatment).

The following parameters were determined to evaluate the effects of different plastic sheet coverings and pruning times:

Temperature Monitoring:

Soil and air temperatures were monitored every five days through the growing season (from late December to late May) using thermisters (model 107B, Campbell Scientific, Edmonton, AB) attached to data loggers. Soil temperature was measured in the center of planted row at a depth of 10 cm, air temperature measured in the centre of the plot.

Bud behavior:

Budbreak progress in all vines was followed by counting all buds with visible green tissue. Time of starting and ending of bud burst in all treatments were recorded. Number of bursted bud and clusters per each vine were counted, and then the percentages of bud burst and fertility were calculated, according to Bessis (1960) during both seasons of the study according to the equations.

$$\text{Bud burst \%} = \frac{\text{No. of bursted buds}}{\text{Total No. of buds}} \times 100$$

$$\text{Bud fertility \%} = \frac{\text{No. of clusters / vine}}{\text{Total No. of buds}} \times 100$$

Chlorophyll contents:

Chlorophyll content in the leaves was extracted in 15 ml acetone and acid washed sand, filtered and absorption values of the filtrate was read using spectrophotometer, then total chlorophyll in leaves in both experimental seasons (mg/g fresh) were determined using the method proposed by (Bonner and Varner, 1965).

Vegetative growth:

Leaf area was measured during the second half of April on fully developed mature leaves (leaves in the middle third of the shoots just above the raceme) by portable area meter LI-COR model LI-3000A No. PAM 1671. The chosen leaves were located on the nodes 7, 8 and 9 from the base of the main shoot according to the suggestion of Bioletti (1938). Average length of 20 shoots made in the middle third of the shoot was measured from late December to late May after the growth had ceased.

All the data collected were subjected to statistical analysis of variance as described by Gomez (1984). The treatment means were compared using L.S.D. test at 0.05 level of probability.

RESULTS AND DISCUSSION

Temperature Monitoring:

Air temperatures:

The effects of different plastic sheet coverings on mean of air temperature for 2007 and 2008 seasons are presented in Table (2) and Fig. (1). Data indicated that (YSCT) yellow sheet coverings trees increased mean of maximum temperatures in the first season by 7.21°C and 6.79°C in the second season, followed by (WSCT) white sheet coverings trees which increased mean of maximum temperatures in the first season on average by 5.77°C and 5.26°C in the first and second season, respectively as compared with control. Also results showed that (YSCT) yellow sheet coverings trees increased mean of minimum temperatures in the first season by 1.97°C and 1.57°C in the second season, that result followed by (WSCT) white sheet coverings trees which increased mean of minimum temperatures in the first season on average by 1.21°C and 1.14°C in the second season. Yellow sheet coverings trees (YSCT) caused an increase in the mean of mean temperatures by 4.59°C in the first season and 4.18°C in the second season, that data followed by (WSCT) white sheet coverings trees which increased the mean of mean temperatures by 3.49°C in the first season and 3.2°C in the second season. These results are in agreement with Benismail and Ejnaoui (2004) working in grape cv. Cardinal who found that, the use of plastic increased the temperature around the plants. Also results seemed to be in line with those obtained by Bowen *et al.* (2004a).

Soil temperatures:

Data concerning the effects of different plastic sheet coverings on mean of soil temperature in both studied seasons are shown in Table (3) and Fig. (2). Data indicated that (YSCS) yellow sheet coverings soil increased mean of maximum soil temperatures in the first season by 1.86°C and 2.23°C in the second season, that result followed by (WSCS) white sheet coverings soil which increased mean of soil maximum temperatures in the first season on average by 1.79°C and 1.45°C in the second season. Also results showed that (YSCS) yellow sheet coverings soil increased mean of minimum soil temperatures in the first season by 1.03°C and 1.05°C in the second season, that result followed by (WSCS) white sheet coverings soil which increased mean of minimum soil temperatures in the first season on average by 0.7°C and 0.69°C in the second season.

Yellow sheet coverings soil (YSCS) caused an increase in the mean of mean soil temperatures by 1.44°C in the first season and 1.64°C in the second season, followed by (WSCS) white sheet coverings soil which increased the mean of mean soil temperatures by 1.24°C in the first season and 1.07°C in the second season. These results seemed to be in line with those obtained by Bowen *et al.* (2004a). They showed that the polyethylene mulch increased soil temperatures by 2C°.

Bud behavior:

Vegetative bud burst time:

Time of starting vegetative bud burst:

Data of 2007 and 2008 seasons represented the effects of different plastic sheet coverings and pruning times on time of vegetative bud burst in table grape "Superior cv." are listed in Tables (4). Results indicated that (P1WSCT) and (P1YSCT) gave the earlier time of starting vegetative bud burst in the two studied seasons, the first season was (18-Jan.) and the second season was (14-Jan.). Also the data were similar between (P15WSCS and P15YSCS) in the first season (31-Jan.), the second season too (25-Jan.). The control treatment was (7-Feb.) in the first season and (3-Feb.) in the second season. This means that the control treatment accerelate vegetative bud burst as compared with (P30YSCT) which was (12-Feb.) and followed by (P30WSCT) which was (15-Feb.) in the first season, but there was no difference between (P30WSCT and P30YSCT) which were (10-Feb.) in the second season. The difference between pruning 1st December with coverings soil, pruning 15th December with covering soil and pruning 30th December with coverings soil may be due to time of starting bud burst and may be cause of time of pruning and not of covering soil. Similar finding were also reported by Avenant (1997) on Erlihane vineyard and might gain support from the work previously done by Martin and Dunn (2000) and Bowen *et al.* (2004b) who investigated the effects of pruning time (7 July or 17 August) on budburst, 13-year-old Cabernet Sauvignon vines, grown in Victoria. They found that later pruning was delayed the onset of budburst by an average of 4.3 days, and 60% budburst by an average of 5.3 days.

Time of ending vegetative bud burst:

According to the data given in Table (4) results showed that, the time of ending vegetative bud burst ranged from -by (2-Feb. to 8-Mar.) in the first season, and (29-Jan. to 5-Mar.) in the second season, also the period to vegetative bud burst was on average by (14 to 18 days) in both seasons. The least period to vegetative bud burst was obtained with (P30YSCT) and (P30WSCT) which were (14 days) in both seasons, followed by [(P1WSCT), (P1YSCT), (P15WSCT) and (P1YSCT)] which were (15 days) in the two seasons. In summary, (P30YSCT) and (P30WSCT) gave the least period for vegetative bud burst (14 days). Although white and yellow sheet coverings soil increased soil temperatures with the difference between timing of pruning, it had no effect on the period of vegetative bud burst in both seasons (18 days) as compared by control.

Flower bud burst time:

Time of starting flower bud burst:

Data illustrated in Table (4) revealed that, the time of starting flower bud burst ranged from (19-Mar. to 19-Apr.) in the first season and (14-Mar. to 16-Apr.) in the second season, also data illustrated that (P1WSCT) and (P1YSCT) were the earlier time of starting flower bud burst in both studied seasons, (19-Mar.) in the first season and (14-Mar.) in the second season, that data followed by (P1WSCS) and (P1YSCS) which were (28-Mar.), (25-Mar.) in the first and second seasons, respectively. As for (P15YSCT) it was (25-Mar.) and (19-Mar.) in the first and second seasons, followed by (P15WSCT) which was (26-Mar.) in the first season and (20-Mar) in the second season moreover, no differences were found between (P15YSCS) and (P15WSCS) in the first season (4-Apr.), also in the second season (29-Mar.). Generally, it can be concluded that, (P1YSCT) and (P1WSCT) advanced flower bud burst by 21 days but (P30YSCS) and (P30WSCS) delayed it by 10 days as compared with control treatment.

Time of ending flower bud burst:

Table (4) demonstrate the effects of different plastic sheet coverings and pruning times on time of ending flower bud burst in table grape "Superior cv." Data showed that, the time of ending flower bud burst was averaged by (8-Apr. to 10-May), (3-Apr. to7-May), respectively in both seasons. The data indicated that, (P30YSCT) gave the short period to flower bud burst (18 days) and (19 days), respectively in both seasons, followed by (P30WSCT) with value (19 days), (20 days) respectively in the two seasons. It can be concluded from the above data that, (P30YSCT) gave the short period to flower bud burst which decreased it by 3-4 days as compared by control treatment (biggest flower period bud burst) which was similar with [(P1WSCS), (P1YSCS), (P15WSCS) and (P15YSCS)].

Number of bud burst, the bud burst percentage and bud fertility:

Results of the effect of different plastic sheet coverings and pruning times on the number of bud burst and the percentage of bud burst of table grape "Superior cv" for 2007 and 2008 seasons are shown in Table (5). Data revealed that, (P1WSCT), (P1YSCT), (P1WSCS), (P1YSCS), (P15WSCT), (P15YSCT), (P30WSCT) and (P30YSCT) caused a significant decrease in the number of bud burst and the percentage of bud burst in both experimental seasons as compared with control. Generally it could be mentioned that (P30WSCS) and (P30YSCS) which produced in (107.0) buds and (89.16%) bud burst percent in the first season. Mean while, in the second season they produced (107.5), (109.0) buds and (89.58 %), (90.83 %), respectively, (P1YSCT) was (82.00) buds, (68.33 %) during 2007 season, (83.50) buds, (69.58 %) during 2008 seasons. Generally, the (P1YSCT) treatment produced the least values regarding these traits. This result agreed with those reported by Avenant (1997) and Keller and Mills (2007). They observed that on average, 25% of buds were killed by cold temperatures in late fall.

Table (5) demonstrate the effects of different plastic sheet coverings and pruning times on bud fertility of table grape "Superior cv" during 2007 and 2008 seasons. Results indicated that, a significant decrease in bud fertility was attained by (P15YSCS), (P15WSCS), (P30WSCT), (P30YSCT), (P15WSCT), (P15YSCT), (P1YSCS), (P1WSCS), (P1WSCT) and (P1WSCT) treatments in both seasons compared by control treatment. Also data showed that, in both seasons no significant difference was observed between (P30WSCS) and (P30YSCS) and control treatment. It can be concluded that, non of treatments gave a significant increase in bud fertility compared by control treatment during the two seasons. The above results agree with those reported by Benismail and Ejnaoui (2004) and Sanchez and Dokoozlian (2005), they determined that the effect of plastic covering on bud burst of grape. They found that, accumulated heat and temperature increase under plastic cover reduced bud fertility of the vine, also they indicated that maximum fruitfulness occurred at 25°C but it was drastically reduced at 32°C. Singh and Gorakh (2009) determined the impact of black polyethylene film (100 micro thick) on flowering in mango cultivars Chausa and Langra in India. They noticed that flowering was enhanced (35-50%) in mulched trees compared to the non-mulched ones.

Vegetative growth:

Leaf area (cm^2):

Table (6) showed the Effects of different plastic sheet coverings and pruning times on leaf area in table grape "Superior cv" at 2007 and 2008 seasons. It can be noticed that, (P30YSCT) gave a highly significant increase compared with all treatments during both experimental seasons, furthermore, the control treatment gave the lowest leaf area during the two seasons. Moreover, data indicated that (P15YSCT), (P1YSCT), (P30WSCT), (P15WSCT), (P1WSCT), (P30YSCS), (P15YSCS) and (P30WSCS) treatments caused a significant increase in leaf area compared with control treatment in both seasons, moreover, a significant increase in leaf area was noticed by (P1YSCS), (P1WSCS) and (P15WSCS) during 2007 season compared with control treatment but no differences were found between them and control treatment during 2008 season. It can be concluded that, pruning in December 30^{th} with yellow and white sheet coverings trees gave the best results. Such result may be caused by accumulation of temperature. Our data are disagree with Phadung *et al.* (2005) who studied the effects of mulching (straw mulching and plastic mulching) on growth of 'Perlette' grape, they showed that mulches did not affect leaf size.

Shoot length:

The effect of different plastic sheet coverings and pruning times on average shoot length in table grape "Superior cv" at 2007 and 2008 seasons are illustrated in Table (6).

Data showed that, (P1YSCT), (P1WSCT), (P1YSCS), (P1WSCS), (P15YSCT), (P15WSCT), and (P15WSCS) increased significantly the average shoot length during both seasons of the study measured at March 1^{st} and May 15^{th} compared with control treatment. No significant differences were found between (P30YSCT), (P30WSCT) and control treatment, in the two studied seasons, of the study measured on March 1^{st}. Regarding the average of shoot length of the study measured on May 15^{th}, (P15YSCS), (P30YSCT) and (P30WSCT) were increased significantly in both seasons compared by control treatment. Our results are agreed with the finding of Ibarra-Jimenez *et al.* (1996) who found that, soil mulching led to a faster formation of branches. Moreover, Bowen *et al.* (2004a&b) and Phadung *et al.* (2005) observed that, the sleeves increased the early growth rate of shoots and enhanced shoot length of perlotte grapevines.

Total chlorophyll:

Data illustrated in Table (6) show the effect of different plastic sheet coverings and pruning times on leaf total chlorophyll at table grape "Superior cv" at 2007 and 2008 seasons. Results showed that during seasons a significant increase was obtained by (P30WSCT), (P15WSCT), (P1WSCT), (P30YSCT) and (P15YSCT) treatments compared with control, while (P1YSCT) increased significantly in the first season only, it compared to control treatment. No significant differences were found among (P30YSCS), (P30WSCS), (P15YSCS), (P15WSCS), (P1YSCS), (P1WSCS) and control treatment during both experimental studied seasons. It can be concluded that, the different pruning time with white sheet coverings trees gave the best results that result may be caused by the percentage of light and high temperatures. Singh and Gorakh (2009) determined the impact of black polyethylene film (100 micro thick) on stomatal behaviour of leaves in mango cultivars Chausa and Langra in India. They declared that significant increase with cultivar variation in gas exchange parameters and chlorophyll fluorescence was recorded in mulched trees. Such result was agreed with our data.

REFERENCES

Ali M. A., EL-Mogy, M. M. and Rizk, I. (2000). Effect of cane length on bud behavior, bunch characteristics, wood ripening and chemical contents of Thompson seedless grapevine. Agric. Sci., Mansoura Univ. 25(3), 1707.

Alxander, S. E. and Clough, G. H. (1998). Spunbonded rowcovers and Calcium fertilization improve quality and yield in bell pepper. HorrtSci. 33:1150-1152.

Avenant, J. H. (1997). The influence of overhead plastic covering on advanced ripening of table grapes in the northern summer-rainfall area. Deciduous Fruit Grower. 47(6):218-225.

Benismail, M. C. and Ejnaoui, A. (2004). Effects of supplement heating on grapevine (*Vitis vinifera* L.) 'Cardinal' cultivated under mild climate in Morocco. Acta Hort. 652:273-279.

Bessis, R. (1960). Sur diferents Models D'expression Quantitative Dela fertile. Chez la Vigne. Aca: 828-882.

Bioletti, F. T. (1938). Outline of ampelography for the vinifera grapes in california Hilgardia II: 227 - 93.

Bonnano, A. R. and Lamont, W. J. (1987). Effect of polyethylene mulches, irrigation method, and row covers on soil and air temperature and yield of muskmelon. J.Am.Soc.Hort.Sci. 2:735-738.

Bonner, J. and Varner, J. F. (1965). Plant biochemistry. Academic press. Newyork. And London.

Bowen, P. (1998). Growing *Echinacea* and other crops intensively. Proc. Lower Mainland Horticultural Improvement Assoc. 40th Annual Short Course. BC Min. Agri. Fo., Abbotsford, BC: 23-25.

Bowen, P. A. and Frey, B. M. (2002). Response of plasticultured bell pepper to staking, irrigation frequency and fertigated nitrogen rate. HortSc. 37: 95-100.

Bowen, P. A., Bogdanoff, C. P. and Estergaard, B. (2004a). Impacts of Using olyethylene sleeves and wavelength-selective mulch in vineyards. I. Effects on air and soil temperatures and degree day accumulation. Can. J. Plant Sci. 4:545-553.

Bowen, P. A., Bogdanoff, C. P. and Estergaard, B. (2004b). Impacts of using polyethylene sleeves and wavelength-selective mulch in vineyards. II. Effects on growth, leaf gas exchange, yield components and fruit quality in vitis vinifera cv. Merlot. Can. J. Plant Sci. 84: 555-568.

Caldwell, M. M. (1970). Plants gas exchange at high wind speeds. Plant Physiol. 46:535-537.

Carbonneau, A. (1984). Place du microclimat de la partie aérienne parmi les facteurs déterminant les productions viticoles. *Bull. OIV* 57: 640– 44.

During, H. (1987). Stomatal responses to alteration of soil and air humidity in grapevines. *Vitis* 26 9: 9–18.

Gaye, M. M., Eaton, G. W. and Jolliffe, P. A. (1992). Row covers and plant architecture influence development and special distribution of bell pepper fruit. HortSc. 27:397-399.

Gerber, J. M. Mohd-khir, I. and Splittstoesser, W. E. (1988). Row tunnel effects on yield and fruit quality of bell pepper. Sci. Hort. 36:191-197.

Gomez, K. A. and A. A. Gomez (1984). Statistical procedures for Agricultural Research 2[nd] Ed. John Wiley sons. Inc-New York.

Guitarez, A. P., Williams, D. W. and Kido, H. (1985). A model of grape growth and development: the mathematical structure and biological cosiderations. Crop Sci. 25:721-728.

Heilman, J. L., McInnes, K. J., Gesch, R. W., Lascano, R. J. and Savage, M. J. (1996). Effects of trellising on the energy balance of a vineyard. *Agric. For. Meteorol.* 81 ½: 79–93.

Howell, G. S. and Strieglar, K. (1998). Pruning grapevine in Michigan. *Hort. Extension Bull.*, Michigan state Univ. Bull. 25,1.

Ibarra-Jimenez, L., Macias-Hernandez, H. and Silva-Ponce, F. D. (1996). Black plastic mulch advantages on grapevine. Agrociencia (Mexico). 30(3):401-404.

Jenni, S., Stewart, K. A., Cloutier, D. C. and Bourgeois, G. (1998). Effect of polyethylene mulches, irrigation methods and row covers on soil and air temperature and yield of muskmelon. J.Am.Soc.Hort.Sci. 33:215-221.

Katerji, N., Daudet, F. A., Carbonneau, A. and Ollat, N. (1994). Etude à l'échelle de la plante entière du fonctionnement hydrique et phosynthétique de la vigne: comparaison des systèmes de conduite traditionnel et an Lyre. *Vitis* 33: 197–203.

Keller, M. and Mills, L. J. (2007). Effect of pruning on recovery and productivity of cold -injured Merlot grapevines. Amer. J. of Enolo. and Vitic. 8(3):351-357.

Kliewer, W. M. (1975). Effect of root temperature on bud-break, root growth and fruit-set of Cabernet Sauvignon grapevines. Am.J.Enol. Vitic. 26:82-89.

Martin, S. R. and Dunn, G. M. (2000). Effect of pruning time and hydrogen cyanamide on budburst and subsequent phenology of *Vitis vinifera* L. variety Cabernet Sauvignon in central Victoria. Australian J. of Grape and Wine Research. 6: 1, 31-39.

Maurer, A. R. and Frey, B. M. (1987). Response of bell peppers to row covers. Agric. and Agri-Food Canada, PARC Agassiz Tech. Rpt. 31, Agassiz, BC.

Motsenbocker, C. E. and Bonanno, A. R. (1989). Row cover effects on air and soil temperatures and yield of muskmelon. HortSci. 24:601-603.

Novello, V., Palma, L. and Tarricone, L. (1999). Influence of cane girdling and plastic covering on leaf gas exchange, water potential and viticultural performance of table grape cv. (Matilde). Vitis 38:51-54.

Novello, V., Palma, L., Tarricone, L. and Vox, G. (2000). Effects of different plastic sheet covering on microclimate and berry ripening of table grape cv (Matilde). J.Int.Sci. Vigne Vine 34:49-55.

Novello, V., Schubert, A., Antonietto, M. and Boschi, A. (1992). Water relations of grapevine cv. Cortese with different training systems. *Vitis* 31:.65–75.

Omar, A. H. and Abdel-Kawi, A. (2000). Optimal bud load for Thompson Seedless grapevine. *J.Agric. Sci. Mansoura Univ.* 25(9), 5769.

Phadung, T., Nilnond, S., Phavaphutanon, L. and Thongpae, S. (2005). Effects ofirrigation and mulching materials on growth, yield and berry quality of 'Perlette' grape. Proceedings of 43rd Kasetsart University Annual Conference, Thailand, 1-4 February. Subject: Plants. 459-466.

Reynolds, A. G., Wardle, D. A. and Naylor, A. P. (1996). Impact of training system, vine spacing, and basal leaf removal on riesling, vine performance, berry composition, canopy microclimate and vineyard labour requirements. *Am. J. Enol. Vit.* 47, (1): 63–76.

Salem, A. T., Kilani, A. S. and Shaker, G. S. (1997). Growth and quality of two grapevine cultivars as affected by pruning severity. *Acta Hort.* 441,309. Sanchez, L. A. and Dokoozlian, N. K. (2005). Bud microclimate and fruitfulness in *Vitis vinifera* L. Am.J.En.Viti. 56(4):319-329.

Shahein, A. H., Osman, M. H. and Asiha, S. A. (1998). Effect of pruning levels on yield and fruit quality of Flame Seedless and Ruby Seedless grapevine cultivars. *Alex. Agric. Res.* 43(2)229.

Singh, V. K. and Gorakh Singh Bhriguvanshi, S. R. (2009). Effect of polyethylene mulch on soil nutrient level and root, leaf and fruiting characteristics of mango (*Mangifera indica*). Ind. J. Agri. Sci. 79(6):411-417.

Smart, R. E. (1985). Principles of grapevine canopy microclimate manipulation with implication for yield and quality: a review. *Am. J. Enol. Vit.* 36, 230–239.

Trambouze, W. and Voltz, M. (2001). Measurement and modelling the transpiration of a Mediterranean vineyard. *Agric. For. Meteorol.* 107 2, 153–166.

Wells, O. S. and Loy, J. B. (1985). Intensive vegetable production with row covers.

HortSci. 20:822-826.

Williams, D. W., Andris, H. L., Beede, R. H., Luvis, D. A., Norton, M. V. K. and Williams, L. E. (1985). Validation of a model for the growth and development of the Thompson Seedless grapevine. I. Vegetative growth and fruit yield. Am.J.Enol.Vitic.36:275-282.

Winkel, T. and Rambal, S. (1990). Stomatal conductance of some grapevines growing in the fields under Mediterranean environment. *Agric. For. Metereol.* 51: 107–121.

Zelleke, A. and Kliewer, W. M. (1979). Influence of root temperature and rootstock on budbreak, shoot growth, and fruit composition of Cabernet Sauvignon grapevines grown under controlled conditions. Am.J.Enol. Vitic. 30:312-317.

Zelleke, A. and Kliewer, W. M. (1980). Effect of root temperature, rootstock and fertilization on bud-break, shoot growth, and composition of Cabernet Sauvignon grapevines. Sci. Hort. 13:339-347.

Table (1): Characteristics of the cover sheet plastic.

Treatments	Covering characteristics
Air and Soil White Plastic	Polyethylene, colour clear, thickness 0.120 mm
Air and Soil Yellow plastic	Polyethylene, colour yellow, thickness 0.120 mm

Table (2): Effects of different plastic sheet coverings on mean of air temperature during 2007 and 2008 seasons.

Treatments	2007			2008		
	Max.	Min.	Mean	Max.	Min.	Mean
WSCT	33.81	15.13	24.47	34.41	15.63	25.02
YSCT	35.25	15.89	25.57	35.94	16.06	26
Control	28.04	13.92	20.98	29.15	14.49	21.82

Fig. (1): Effects of different plastic sheet coverings on mean of air temperature during 2007 and 2008 seasons.

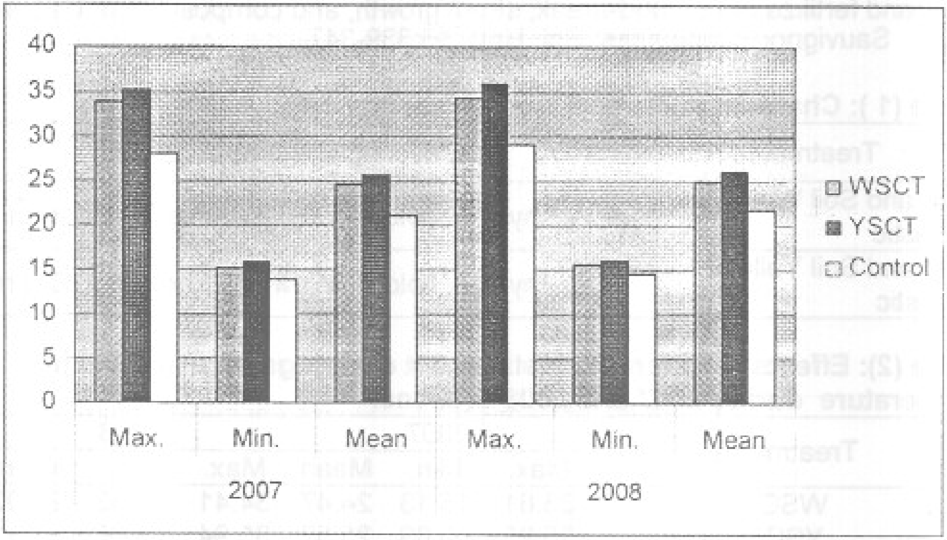

Table (3): Effects of different plastic sheet coverings on mean of soil temperature during 2007 and 2008 seasons.

Treatments	2007			2008		
	Max.	Min.	Mean	Max.	Min.	Mean
WSCS	23.95	16.13	20.04	24.34	16.46	20.40
YSCS	24.02	16.46	20.24	25.12	16.82	20.97
Control	22.16	15.43	18.80	22.89	15.77	19.33

Fig. (2): The effects of different plastic sheet coverings on mean of soil temperature during 2007 and 2008 seasons.

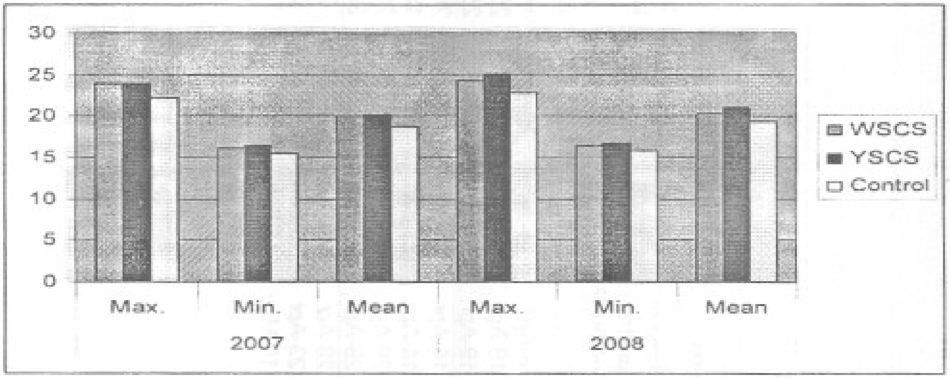

Table (4): Effects of different plastic sheet coverings and pruning times Superior "on time of vegetative and flowering bud burst in table grape at 2007and 2008 seasons."cv.

Treatments		2007				2008			
		Vegetative bud burst		Flower bud burst		Vegetative bud burst		Flower bud burst	
Pruning time	Coverings sheets	Time of starting bud burst	Time of ending bud burst	Time of starting bud burst	Time of ending bud burst	Time of starting bud burst	Time of ending bud burst	Time of starting bud burst	Time of ending bud burst
1st December	WSCT	18-Jan.	2-Feb.	19-Mar.	8-Apr.	14-Jan.	29-Jan.	14-Mar.	3-Apr.
	YSCT	18-Jan.	2-Feb.	19-Mar.	8-Apr.	14-Jan.	29-Jan.	14-Mar.	3-Apr.
	WSCS	22-Jan.	9-Feb.	28-Mar.	19-Apr.	19-Jan.	6-Feb.	25-Mar.	16-Apr
	YSCS	22-Jan.	9-Feb.	28-Mar.	19-Apr.	19-Jan.	6-Feb.	25-Mar.	16-Apr.
15th December	WSCT	27-Jan.	11-Feb.	26-Mar.	15-Apr.	21-Jan.	5-Feb.	20-Mar.	9-Apr.
	YSCT	26-Jan.	10-Feb.	25-Mar.	14-Apr.	21-Jan.	5-Feb.	19-Mar.	8-Apr.
	WSCS	31-Jan.	18-Feb.	4-Apr.	26-Apr.	25-Jan.	12-Feb.	29-Mar.	20-Apr.
	YSCS	31-Jan.	18-Feb.	4-Apr.	26-Apr.	25-Jan.	12-Feb.	29-Mar.	20-Apr.
30th December	WSCT	15-Feb.	1-Mar.	9-Apr.	28-Apr.	10-Feb.	24-Feb.	5-Apr.	25-Apr.
	YSCT	12-Feb.	26-Feb.	5-Apr.	23-Apr.	10-Feb.	24-Feb.	3-Apr.	22-Apr.
	WSCS	18-Feb.	8-Mar.	19-Apr.	10-May	15-Feb.	5-Mar.	16-Apr.	7-May.
	YSCS	18-Feb.	8-Mar.	19-Apr.	10-May	16-Feb.	5-Mar.	16-Apr.	7-May.
Control		7-Feb.	25-Feb.	9-Apr.	1-May	3-Feb.	21-Feb.	5-Apr.	27-Apr.

Table (5): Effects of different plastic sheet coverings and pruning times on number of bud burst, the percentage of bud burst and bud fertility of table grape "Superior cv" at 2007 and 2008 seasons.

Treatments		2007			2008		
Pruning time	Coverings Sheets	Number of bud burst	Bud burst (%)	Bud fertility (%)	Number of bud burst	Bud burst (%)	Bud fertility (%)
1st December	WSCT	84.50	70.41	6.67	86.75	72.29	7.71
	YSCT	82.00	68.33	5.83	83.50	69.58	7.08
	WSCS	98.50	82.08	8.54	100.5	83.75	10.21
	YSCS	99.00	82.50	8.75	101.8	84.83	10.21
15th December	WSCT	89.25	74.38	12.08	92.75	77.29	13.33
	YSCT	87.75	73.13	11.04	89.25	74.38	12.29
	WSCS	102.5	85.42	18.96	105.0	87.5	21.04
	YSCS	103.0	85.83	19.17	105.0	87.5	22.08
30th December	WSCT	95.50	79.58	14.38	96.75	80.63	16.88
	YSCT	92.50	77.08	13.13	93.25	77.71	15.00
	WSCS	107.0	89.16	23.96	107.5	89.58	24.79
	YSCS	107.0	89.16	23.96	109.0	90.83	25.21
Control		103.3	86.08	23.13	105.5	87.92	25.21
L.S.D at 0.05 %		4.221	3.521	1.096	3.583	2.984	1.682

Table (6): Effects of different plastic sheet coverings and pruning times on Average shoot length, leaf area and total chlorophyll in table grap "Superior cv" at 2007 and 2008 seasons.

Treatments		2007				2008			
Pruning time	Coverings sheets	Shoot length (cm) at 1st March	Shoot length (cm) at 15th May	Leaf area (cm^2)	Total chlorophyll (mg/gm	Shoot length (cm) at 1st March	Shoot length (cm) at 15th May	Leaf area (cm^2)	Total chlorophyll (mg/gm)
1st December	WSCT	30.25	185.0	170.1	2.205	36.0	190.0	184.5	2.213
	YSCT	36.00	188.5	175.1	1.688	39.0	195.0	188.3	1.737
	WSCS	29.50	160.0	135.6	1.278	31.0	166.0	141.1	1.298
	YSCS	30.00	162.0	138.9	1.278	31.8	169.0	142.3	1.313
15th December	WSCT	20.00	168.0	170.5	2.253	22.5	180.3	187.3	2.310
	YSCT	22.25	171.0	176.5	1.710	25.0	187.0	190.0	1.845
	WSCS	17.75	147.0	135.1	1.278	18.0	150.8	143.0	1.313
	YSCS	17.00	147.0	138.6	1.278	18.3	155.0	146.5	1.320
30th December	WSCT	10.00	145.3	171.4	2.260	13.5	165.3	188.5	2.303
	YSCT	11.50	152.0	178.5	1.710	15.5	177.3	193.5	1.895
	WSCS	7.500	98.00	137.3	1.303	9.0	134.0	144.2	1.352
	YSCS	8.000	100.3	140.2	1.317	10.0	140.3	148.4	1.418
Control		13.00	121.0	125.6	1.278	15.0	128.0	134.9	1.308
L.S.D at 0.05 %		4.367	2.897	6.734	0.2796	2.245	7.842	7.610	0.4056

الملخص العربي

تأثير التغطية البلاستيكية المختلفة ومواعيد التقليم علي درجة حرارة الجو والتربة والنمو الخضري وسلوك البراعم في عنب المائده صنف (سوبريور).

محمود احمد علي – ثناء مصطفي عز – أنور محمد ابوالمعاطي
كلية الزراعة سابا باشا – قسم الانتاج النباتي – جامعة الاسكندرية.

أجريت هذه الدراسة خلال موسمي 2007 و2008 علي شجيرات العنب صنف (سوبريور) في مزرعه خاصه بقرية محمد متولي الشعراوي – مدينة النوبارية – محافظة البحيرة – جمهورية مصر العربية. تم تقليم الشجيرات في 1 و15 و30 ديسمبر ثم تمت تغطيتها بالبلاسيك الابيض والاصفر وذلك بالنسبة للجو والارض. وتم دراسة تأثير التقليم والتغطية علي حرارة الجو والتربة والنمو الخضري وسلوك البراعم. أدت التغطية بالبلاستيك الاصفر للاشجار الي زيادة درجة حرارة الجو العظمي بمقدار 7.2 درجه منويه يليها البلاستيك الابيض الذي أدي الي زيادة درجة الحرارة بمقدار5.5 درجه منويه ، ايضا البلاستيك الاصفر أدي الي زيادة متوسط درجة الحرارة الصغري بمقدار 1.8 درجه يليه البلاستيك الابيض بمقدار 1.2 درجة. كما أدي استخدام البلاستيك الاصفر والابيض للشجيرات مع التقليم في 1 ديسمبر الي تبكير تفتح البراعم الخضريه بمقدار20يوم ولكن تغطية التربه بالبلاستيك الاصفر والابيض مع التقليم في 30 ديسمبر ادت الي تأخير تفتح البراعم بمقدار 11 يوم مقارنة بالكنترول. كما ادي استخدام التغطية بالبلاستيك الاصفر والابيض للشجيرات مع التقليم في 30 ديسمبر الي اقل فتره تفتح خضري للبراعم (14 يوم) ولكن لم يوجد اختلاف معنوي بين كل انواع التغطيه الارضيه مع كافة انواع التقليم مقارنة بمعامله الكنترول(18 يوم). كما أدي استخدام البلاستيك الاصفر والابيض للشجيرات مع التقليم في 1 ديسمبر الي تقدم تفتح البراعم الزهريه بمقدار21يوم ولكن تغطية التربه بالبلاستيك الاصفر والابيض مع التقليم في 30 ديسمبر ادت الي تأخير تفتح البراعم بمقدار 10 يوم

مقارنة بالكنترول. كما أدي استخدام البلاستيك الاصفر للشجيرات مع التقليم في 30 ديسمبر الي اقل فتره تفتح زهري للبراعم والتي انخفضت بمقدار 3-4 يوم مقارنة بالكنترول.

سجلت التغطيه الارضية باللون الابيض والاصفر مع التقليم في اخر الشهر أعلي عدد ونسبة براعم متفتحه معنويا بينما التقليم في اول الشهر مع تغطية الشجيرات باللون الاصفر اعطي اقل معنويه مقارنة بالكنترول. كما سجل الكنترول اعلي معنويه رقم خصوبة البراعم بينما التقليم في اول الشهر مع تغطية الشجيرات باللون الاصفر والابيض اعطي اقل اختلاف معنوي. أيضا التقليم في اخر الشهر مع تغطية الشجيرات باللون الاصفر اعطي اعلي اكبر مساحة الاوراق مقارنة بكل المعاملات بينما الكنترول كان اقلها معنويا. أدي استخدام البلاستيك الاصفر والابيض للشجيرات مع التقليم في 1 ديسمبر الي حدوث زيادة معنويه في متوسط طول النمو الخضري. أظهرت النتائج أن التقليم بكل مواعيده المختلفه مع تغطية الشجيرات باللون الابيض سجل اعلي زيادة معنوية وذلك بالنسبه للكلوروفيل الكلي في الاوراق.