RESULTS AND DISCUSSION

IV – RESULTS AND DISCUSSION

IV – I – Phynological phases:

IV - I - 1 - Start of vegetative bud breaking:

With regard to the start of vegetative bud breaking of some plum cultivars under study, the obtained results presented in Table (1) and Fig. (1) showed that Hollywood cultivar was the earliest one in this respect, it started on March 3rd and March 8th in both 1st and 2nd seasons, respectively. Meanwhile, both El-Dorado and Santa Rosa cultivars ranked the last, whereas their vegetative buds burst in March (13 & 18th) and (14 & 15th) during two experimental seasons for 1st & 2nd cultivars, respectively. Moreover other cultivars came in between. Furthermore, it could be mentioned that the difference between the earliest cultivar (Hollywood) and the latest one (El-Dorado) reached about 11 and 7 days in the 2001 and 2002 seasons of study, respectively, while the difference between the earliest cultivar (Hollywood) and the second latest one (Santa Rosa) reached 10 days in both 2001 and 2002 seasons.

These results are in agreement with those reported by **Saeid et al. (1993),** working to evaluate of some plum cultivars (Hollywood, Methly, Clymax, Golden Japanese and Santa Rosa), they reported that Hollywood is the earliest cultivar in vegetative bud burst followed by Clymax, Methly, Golden Japanese and

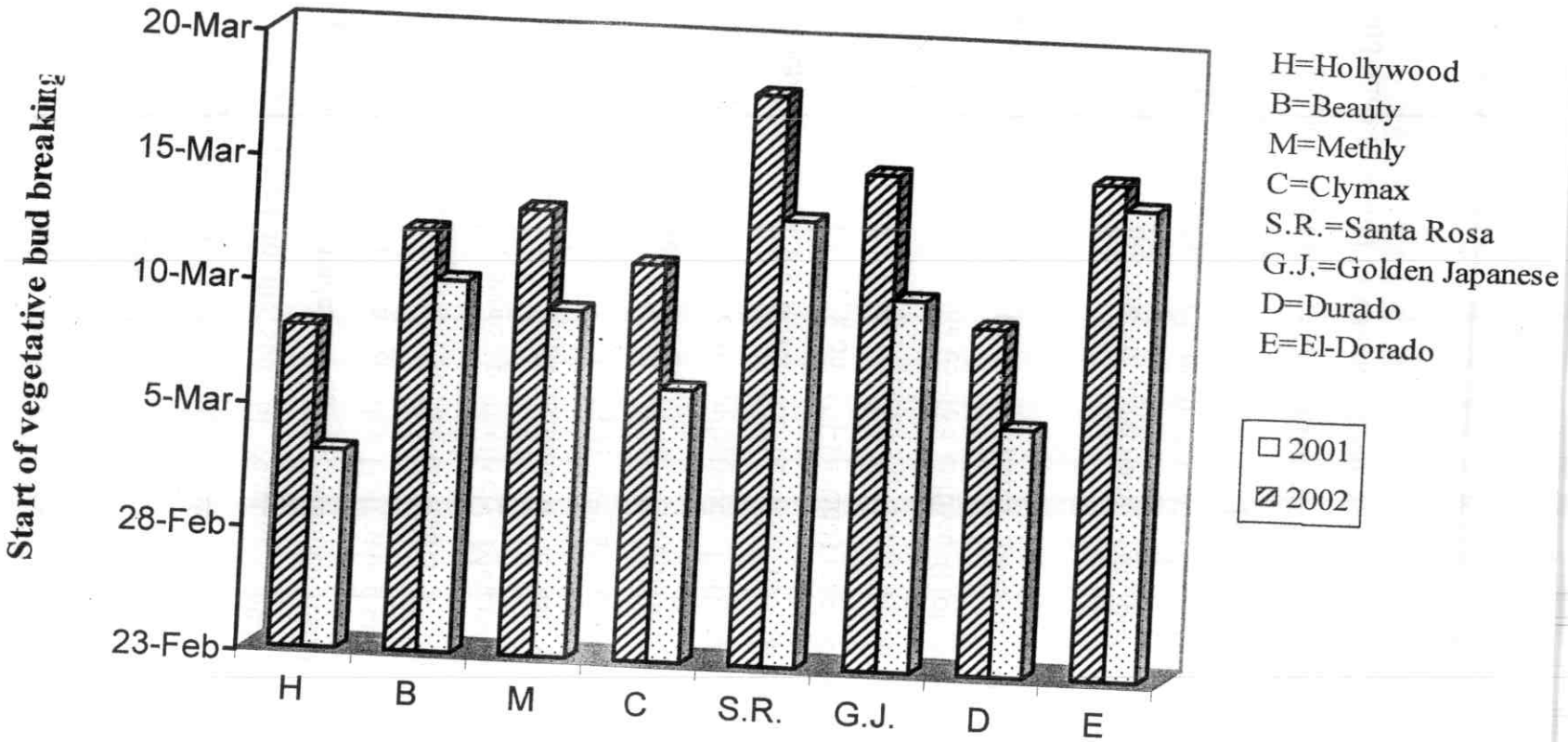

Figure (1): Starting dates of vegetative bud breaking for eight japanese plum cultivars evaluated during both 2001 and 2002 seasons

Santa Rosa cultivars, respectively. The earliness in vegetative bud burst reached about 8,10 & 7,7 & 4,5 and 3,3 days in the two seasons respectively compared with Santa Rosa which was the latest cultivar.

IV - I - 2 - Start of floral bud breaking:

Concerning the floral bud breaking of the investigated plum cultivars, it could be noticed from the obtained data tabulated in Table (1) and Fig. (2) that the beginning of floral buds to burst for the eight studied plum cultivars varied not only from one cultivar to another but also from year to another even for the same cultivar. However, Hollywood plum cultivar was the earliest cultivar, it started on February 28th and March 3rd in the 1st and 2nd seasons of study, respectively.

Contrary to that Santa Rosa and Golden Japanese cultivars tended to be the lastest ones, whereas their floral buds started to burst during both 2001 and 2002 seasons on (March 12 & 17th) and (March 8 & 14th) for the former and later cultivars, respectively. In other words variances between the earliest cultivar (Hollywood) and the latest ones (Santa Rosa and Golden Japanese) prolonged to about 10-14 days during both seasons, respectively (as an average of two latest cultivars was concerned).

Neverthless, other evaluated plum cultivars came in between the abovementioned two extremes and could be divided

into two categories i.e. the first included (Beauty, Clymax, Durado) while 2nd included (Methly & El-Dorado), whereas 3 cultivars of former group were earlier than two cultivars of later one. In other words, Beauty, Clymax and Durado culativars. Delayed than Hollywood cultivar (the earliest cultivar) with (1-3) and (2-5) days during 1st and 2nd seasons, respectively. However, the delay in start of floral bud breaking for both Methly and El-Dorado cultivars. Was more prolonged as extended for about 8 days with later and former cultivars during 1st and 2nd seasons, respectively.

It is quite clear to be noticed that breaking of vegetative buds started later after the floral bud breaking had been taken place during both experimental seasaons for all eight plum cultivars under evaluation.

Saeid et al. (1993), working to evaluate some plum cultivars (Hollywood, Methly, Clymax, Golden Japanese and Santa Rosa), they reported that Hollywood is the earliest cultivar in flower bud burst followed by Clymax, Methly, Golden Japanese and Santa Rosa cultivars, respectively.

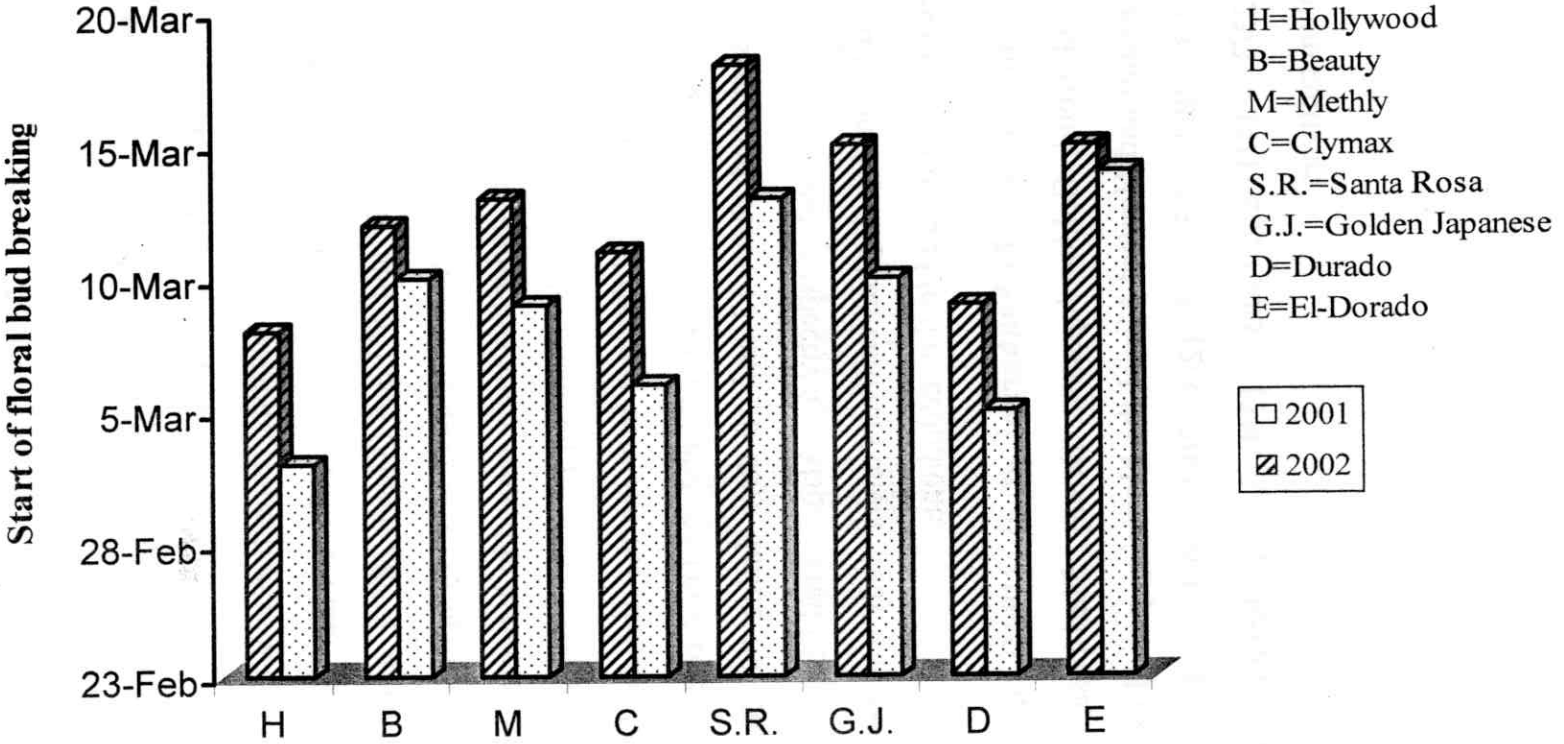

Figure (2): Starting dates of floral bud breaking for eight japanese plum cultivars evaluated during both 2001 and 2002 seasons

IV - I - 3 - Full bloom:

Regarding the date of full bloom, the obtained data presented in Table (1) and Fig. (3) showed that the full blooming stage was evident early in Hollywood cultivar on March 21st and 25th in 2001 and 2002 seasons, respectively. While the full bloom of both Santa Rosa and Beauty cultivars take place latest in this respect (Apr. 4th and 5th) and (March 28th & April 7th during the 2001 and 2002 seasons, respectively. In addition to that, other plum cultivars under this study ranged in between in this concern. Moreover, it could be observed from the obtained results in this concern that the difference between the earliest cultivar in full bloom i.e. Hollywood cultivar and the latest one i.e. Santa Rosa was reached about 13 and 10 days during the 2001 and 2002 seasons of study, respectively. Also, it could be noticed that the full bloom for all plum cultivars under study was early in the first season as compared to the second one.

In this respect **El-Fakharani et al. (1994),** mentioned that Hollywood, Golden Japanese, Beauty, Mari-posa, Durado, El-Dorado and Howard Miracl the blooming period extended from (2/3 – 30/3), (2/3 – 6/4), (2/3 – 30/3), (30/3 – 20/4), (30/3 – 13/4), (23/3 – 14/4) and (30/3 – 13/4) for the abovementioned seven plum cultivars.

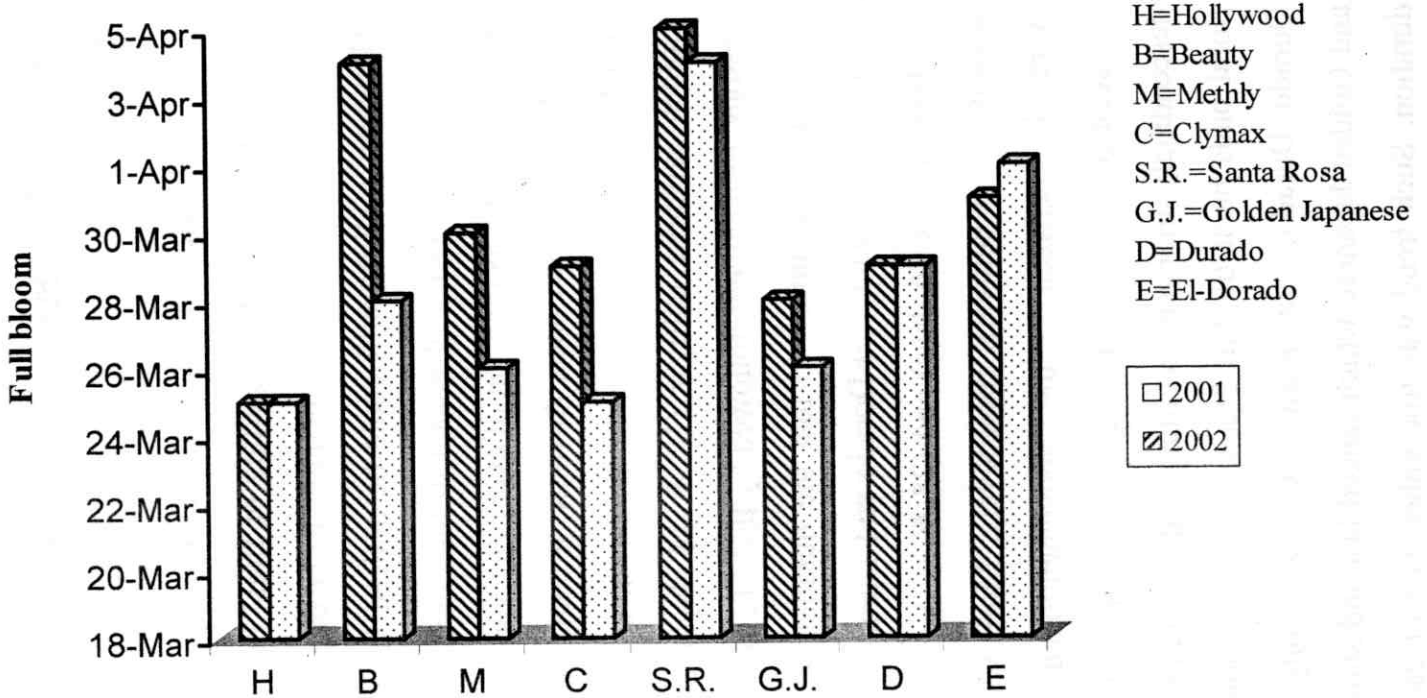

Figure (3): Dates of full bloom for eight japanese plum cultivars evaluated during both 2001 and 2002 seasons

IV - I - 4 – Flowering duration (days from start till full bloom):

Tabulated data in Table (1) and Fig. (4) declared that the duration extended from starting of floral buds to burst until full bloom stage varied considerably from one cultivar to another. However, a slight shift could be noticed in specific duration of each cultivar from one season to the other, in spite of the trend was still stable as duration of every cultivar compared to those of the other evaluated ones. Anyhow, it could be safely concluded that he shortest duration was always in concomitant to the the Golden Japanese cultivar (18 & 14 days) during 1st and 2nd seasons, respectively, followed by that of Hollywood cultivar (21 & 22 days). Contrary to that the duration was prolonged and reached with Beauty, El-Dorado and Durado cultivars to (25 & 30 days); (26 & 26 days) and (25 & 24 days) during 1st and 2nd seasons for 3 cultivars, respectively. Moreover, other cultivars were in between the abovementioned two extremes. Consequently, different evaluated plum cultivars could be descendingly arranged according to their duration extended from floral buds burst till full bloom stage as follows:- Beauty; El-Dorado; Durado; Santa Rosa, or Clymax; Hollywood, or Methly and Golden Japanese which ranked last and showed the shortest duration. Such trend was true either data of each season or an average of two seasons were concerned.

Table (1): Dates of some phynological phases (start of both vegetative and floral buds breaking; full bloom stage and duration till full blooming) of eight japanese plum cultivars investigated during two successive seasons of 2001 and 2002

Cultivars	Measuring dates							
	Start of vegetative bud breaking		Start of floral bud breaking		Full bloom		Duration from start till full bloom in days	
	2001	2002	2001	2002	2001	2002	2001	2002
Hollywood	March 3rd	March 8th	Feb. 28th	March 3rd	March 25th	March 25th	21	22
Beauty	March 10th	March 12th	March 3rd	March 7th	March 28th	April 4th	25	30
Methly	March 9th	March 13th	March 4th	March 11th	March 26h	March 30th	22	19
Clymax	March 6th	March 11th	March 2nd	March 8th	March 25th	March 29th	23	21
Santa Rosa	March 13th	March 18th	March 12th	March 27th	April 4th	April 5th	23	20
G. Japanese	March 10th	March 15th	March 8th	March 14th	March 26th	March 28th	18	14
Durado	March 5th	March 9th	March 1st	March 5th	March 29th	March 29th	25	24
El-Dorado	March 14th	March 15th	March 8th	March 5th	April 1st	March 31st	26	26

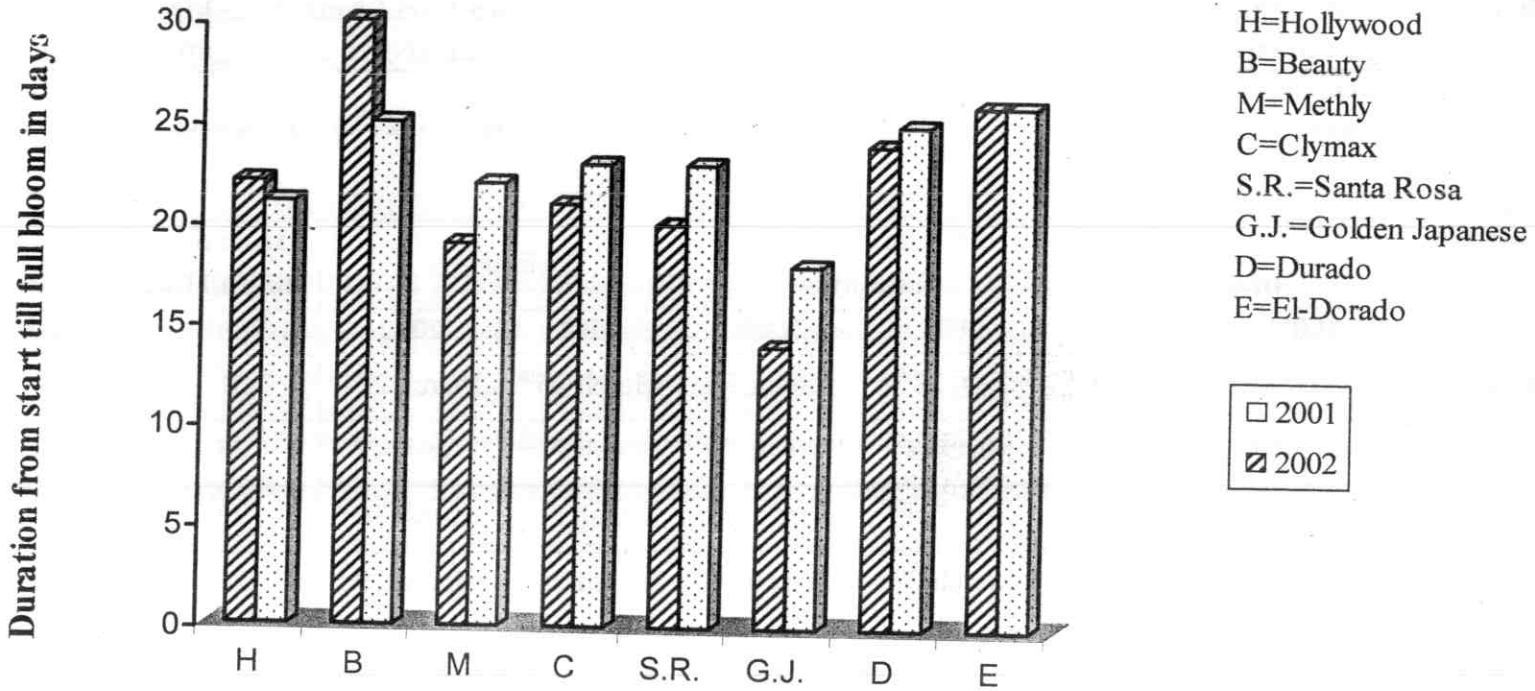

Figure (4): Blooming duration (days from start till full bloom stage) for eight japanese plum cultivars evaluated during 2001 and 2002 seasons

IV - I - 5 - Fruit set:

Results tabulated in Table (2) and illustrated by Fig. (5) show clearly that regarding the date of fruit set, Hollywood cultivar was the earliest one in this concern (March 22nd and March 27th) during the first and second seasons of study, respectively. Meanwhile, the latest cultivars in this regard were both Santa Rosa and El-Dorado (April, 7th) for both in the 2001 season. However in 2nd season fruit set delayed in Santa Rosa cultivar then El-Dorado with 2 days i.e, April 10th & 8th for two cultivars, respectively. Moreover, other cultivars under study came in between the abovementioned two extents. In addition, the differences between both the earliest and latest cultivars reached about 16 days in the 2001 season and 14 days in the 2002 season of study.

IV - 1 - 6 - Harvesting date:

Data obtained during both 2001 & 2002 experimental seasons regarding harvesting date of the eight evaluated plum cultivars as shown from Table (2) and Fig. (6) revealed obviously that all investigated cultivars were considerably varied in this respect. According to maturation and suitability of fruits for harvesting, the plum cultivars under study could be categorized into four distinguished groups. The first group represented the very early cultivars that includes both Hollywood and Beauty

cultivars, whereas their fruits reached the developmental stage for being suitable to be picked within the 1st week of June. Hollywood fruits were harvested on (June 1st & 5th), while with Beauty its harvesting date coincided to (June 4th & 8th) during 2001 & 2002 seasons, respectively. However, the second group (early cultivars) included both Methly and Clymax, whereas maturation of their fruits took place within the second week of June (beginning and end of second week of June) during 1st and 2nd seasons, respectively "irrespective of cultivar".

Meanwhile, third category includes Golden Japanese only as an intermediate cultivar, whereas its fruits had been harvested at the end or beginning of second and third weeks of June during 2001 and 2002 seasons, respectively (June 12th and 17th). In addition, the fourth category includes the most three delayed ones i.e., Santa Rosa; El-Dorado and Durado cultivars, which were harvested during the last week of June (23-26 and 29-30 June).

Figure (5): Date of fruit set for the investigated eight japanese plum cultivars during both 2001 and 2002 seasons

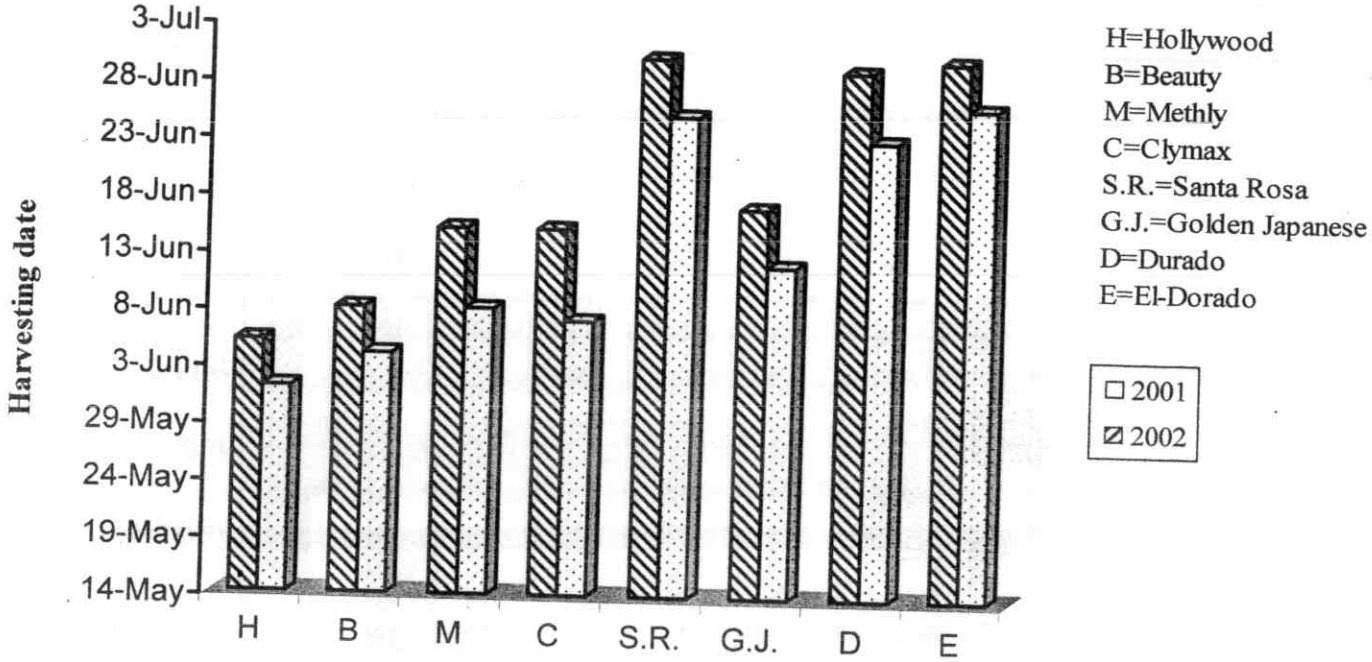

Figure (6): Harvesting date for the investigated eight japanese plum cultivars during both 2001 and 2002 seasons

IV - I - 7 - Duration from full bloom till harvesting:

Data presented in Table (2) and illustrated in Fig. (7) displayed that the duration calculated from full bloom till harvesting were greatly varied from one cultivar to another and to some extent among first and second 2001 & 2002 seasons. The shortest duration was usually in concomitant to Beauty cultivar (68 and 62 days) during 1st and 2nd seasons, respectively. Hollywood ranked second (72 days) during both seasons, followed by Methly (74 & 77) and Clymax (74 & 78 days) during 1st & 2nd seasons. In addition, both Durado and El-Dorado cultivars required the most prolonged duration from full bloom till harvesting (89/86 & 92/91 days) during 1st and 2nd seasons for former and later cultivars, respectively.

Nevertheless, it was so interesting to be noticed the closed negative relationship between the duration extended from starting floral bud burst till full blooming stage and the corresponded duration needed from full bloom until fruits harvesting as data of two seasons pertaining both parameters for a given cultivar were taken into consideration. In this regard, the period required from full blooming till fruit harvesting for Beauty cultivar in the second 2002 seasons was shortened below the 1st season which reflected the more prolonged duration from start to full bloom during 2nd season rather the 1st one. On the other hand the reverse

Table (2): Measuring dates of some phynological phases (fruit set & harvesting and duration in days from full bloom till harvesting of eight japanese plum cultivars investigated during two successive seasons of 2001 and 2002

Cultivars	Measuring dates					
	Fruit set		Harvesting date		Duration from full bloom till harvesting in days	
	2001	2002	2001	2002	2001	2002
Hollywood	March 22nd	March 27th	Jun 6th	Jun 5th	72	72
Beauty	April 1st	April 9th	Jun 4th	Jun 8th	68	62
Methly	March 28th	April 3rd	Jun 8th	Jun 15th	74	77
Clymax	March 28th	April 1st	Jun 7th	Jun 15th	74	78
Santa Rosa	April 7th	April 10th	Jun 25th	Jun 30th	82	86
G. Japanese	April 1st	April 3rd	Jun 12th	Jun 17th	78	81
Durado	March 31st	April 4th	Jun 23rd	Jun 29th	89	92
El-Dorado	April 7th	April 8th	Jun 26th	Jun 30th	86	91

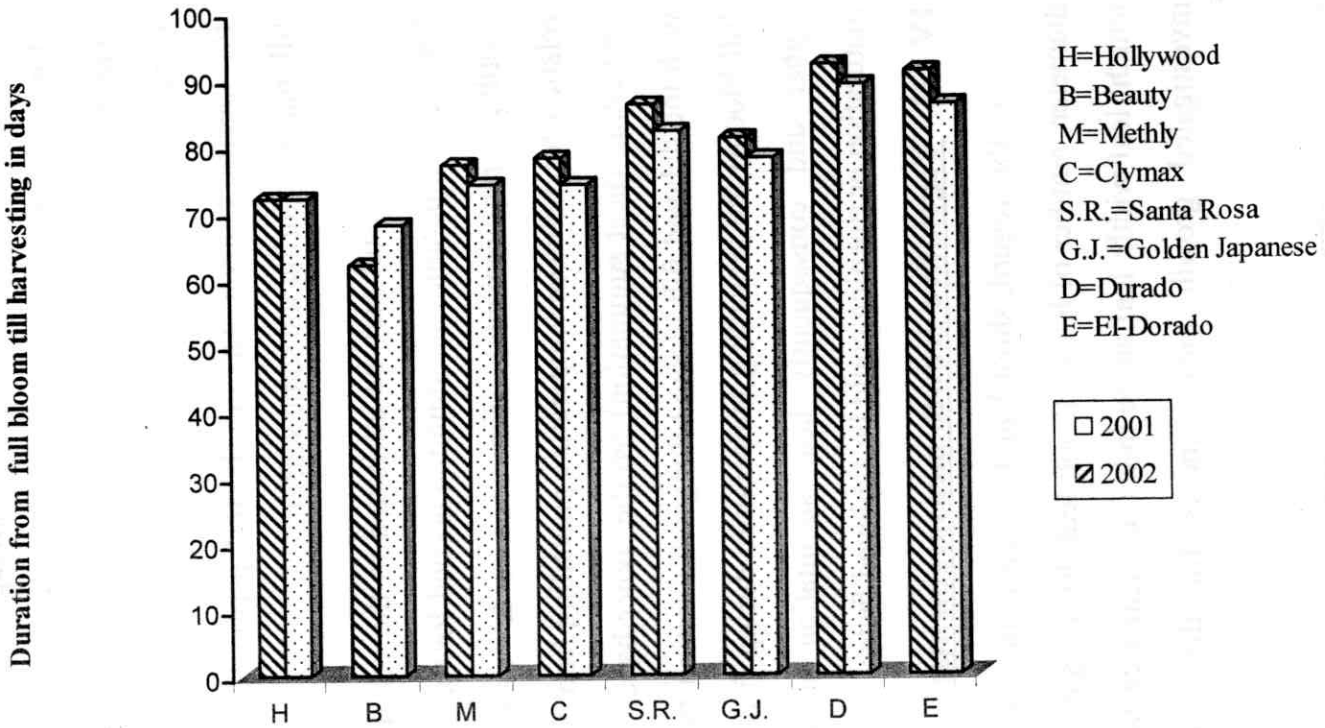

Figure (7): Duration from full bloom till harvesting (in days) for the investigated eight japanese plum cultivars during both 2001 and 2002 seasons

was detected with Methly; Clymax; Santa Rosa and Golden Japanese cultivars, whereas the period required from full bloom till harvesting during 2nd season was considerably shortened than in 1st one from one hand and corresponded to the analogous elongation of the duration from start until full bloom in the same season from the other side. Generally, it could be safely concluded that the longest duration from starting to full blooming for specific cultivar was the shortest period from full blooming till maturity during the same season.

Such result may be attributed to the positive relationship between temperature and duration needed for reaching full bloom (chilling requirements) from one side and the negative relationship between temperature prevailing from full bloom until harvesting (heat summation) fro the other hand. In other words with the delayed full bloom (elongated duration from starting till full bloom) the prevailing temperature during fruit set is usually higher and consequently heat summation needed for fruit maturation or ripening could be achieved faster.

IV - II - Vegetative growth measurements:

In this regard, shoot length increase; increment % in trunk diameter; number of leaves/shoot; leaf dry weight; leaf area; leaf length; leaf width; leaf shape index and leaf area factor were the investigated growth measurements for the evaluated eight

japanese plum cultivars under study. Data obtained during both seasons are presented in Tables (3) & (4) and illustrated in Fig. (8), (9), (10), (11), (12), (13) and (14).

IV - II - 1 – Shoot length increase:

Table (3) and Fig. (8) shows that Methly plum cultivar exhibited statistically the highest value of shoot length increase in both 2001 & 2002 seasons. Beauty cultivar ranked second, however difference was significant in second season only as compared to Methly. Moreover, other evaluated plum cultivars could be arranged regarding the exhibited increase in their shoots length into the following descending order: Clymax which ranked third; Santa Rosa; Golden Japanese; Hollywood and/or El-Dorado while Durado cultivar came last. Such trend was true either data of each experimental seasaon or an average of two seasons were concerned.

The present result is in partial agreement with the findings of **Bostan, (1977) and Saeid et al. (1993),** both reported that shoot length is a specific character of each investigated plum cultivar.

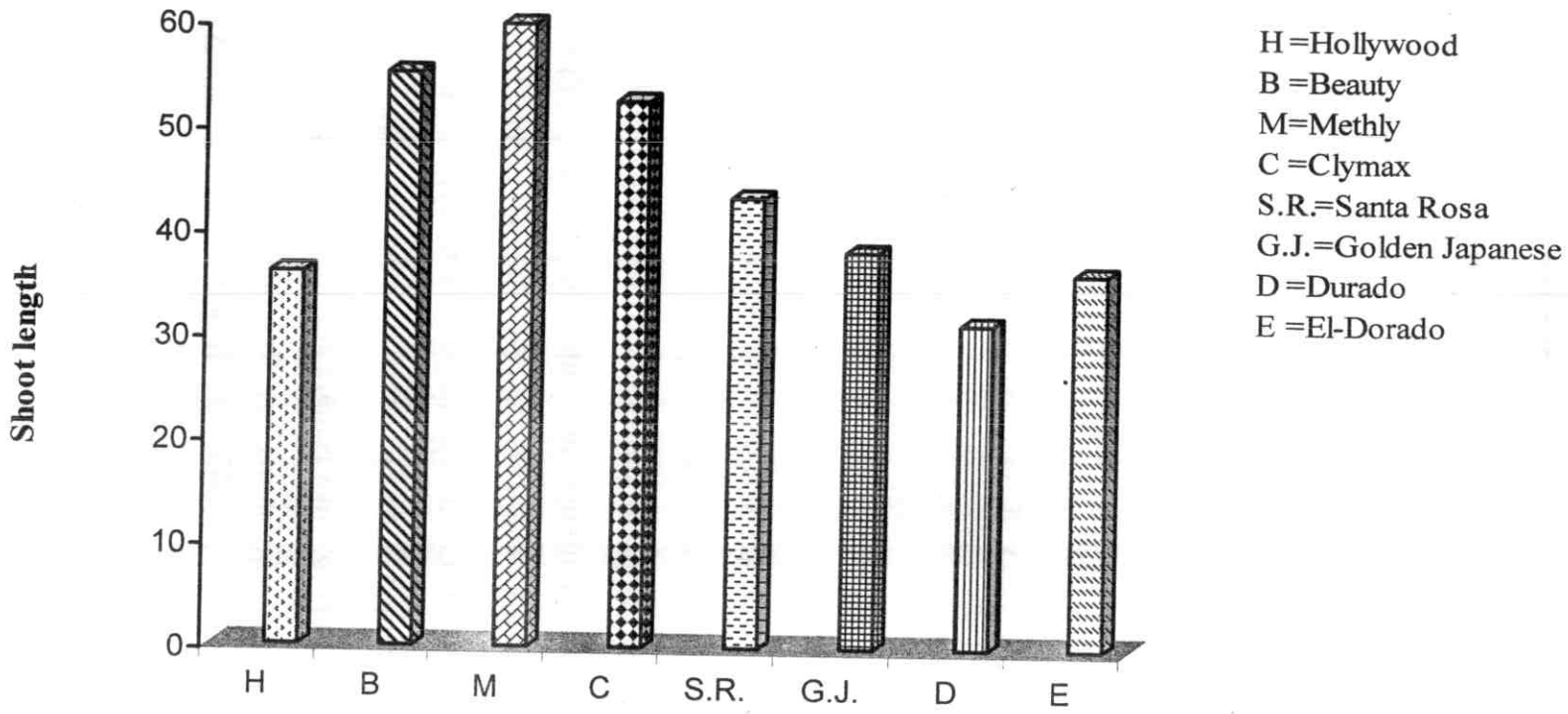

Figure (8): Shoot length (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

IV - II - 2 – Increment percentage in trunk diameter:

It is quite evident as shown from Table (3) and Fig. (9) that annual increment % exhibited in trunk diameter of 8 evaluated japanese plum cultivars didn't follow firm trend during both experimental seasons. Hence, the higher increment % exhibited in trunk diameter for trees belonging to one plum cultivar in a given season corresponded in most cases to the lowest percentage in next season. Whereas both Beauty and Clymax plum cultivars showed the higest increment % during 1st season but the reverse was detected in second season. Meanwhile, Durado cultivar had the lowest increment % in 1st season but the highest rate of increase in 2nd season. On the other hand, Hollywood; Santa Rosa; Golden Japanese and El-Dorado plum cultivars showed a relative stable trend in this respect as they showed in most cases the lowest percentage of increment in trunk diameter as data of each season was taken into consideration. On the other hand Fig. (9) shows that the above mentioned four plum cultivars showed also the least value of increment % in trunk diameter as an average of two seasons was concerned i.e. 2.07; 2.43; 2.50 and 2.51% for Hollywood; El-Dorado; Golden Japanese and Santa Rosa cultivars, respectively.

In addition, Durado; Beauty; Clymax and Methly plum cultivars as shown from Fig. (9) exhibited a higher increment % in their trunk diameter as an average of two seasons was concerned 2.85; 2.81; 2.80 and 2.7%, respectively.

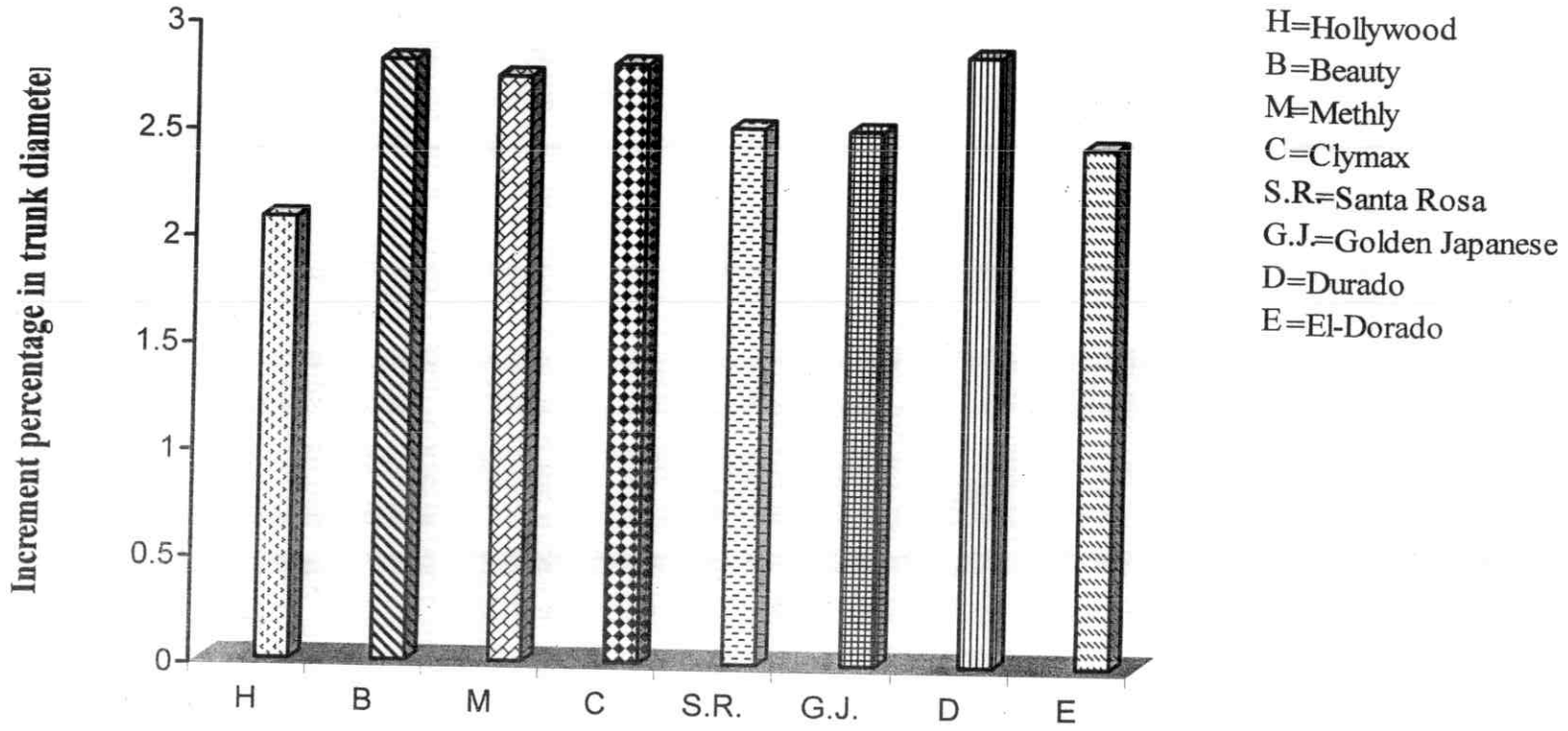

Figure (9): Increment percentage in trunk (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

The variance in increment % of trunk diameter from one season to another may reflect other effective factors like load and productivity through the previous season.

IV - II - 3 - Number of leaves per shoot:

With regard to the number of leaves per shoot as influnced by plum cultivars, it is quite clear as shown from Table (3) and Fig. (10) that the differences were so pronounced. Hence, Methly plum cultivar surpassed statistically the other evaluated cultivars as its shoots had the greatest number of leaves per each during two seasons of study. Meanwhile, both Clymax and Beauty cultivars ranked second after Methly, in spite of differences didn't reach level of significance with comparing Beauty and Clymax to Methly during 1st and 2nd seasons, respectively.

Moreover, other five evaluated plum cultivars could be descendingly arranged as shown from Fig. (10) and Table (3) as follows:

Santa Rosa; Hollywood; Golden Japanese; El-Dorado and Durado cultivars, however differences between them were not significant. Anyhow, the highest number of leaves per each individual shoot was in closed relationship to Methly cultivar, while the reverse was always coupled to shoots of Durado cultivar. Such trend was true during both seasons either data of each season or an average of two seasons were concerned.

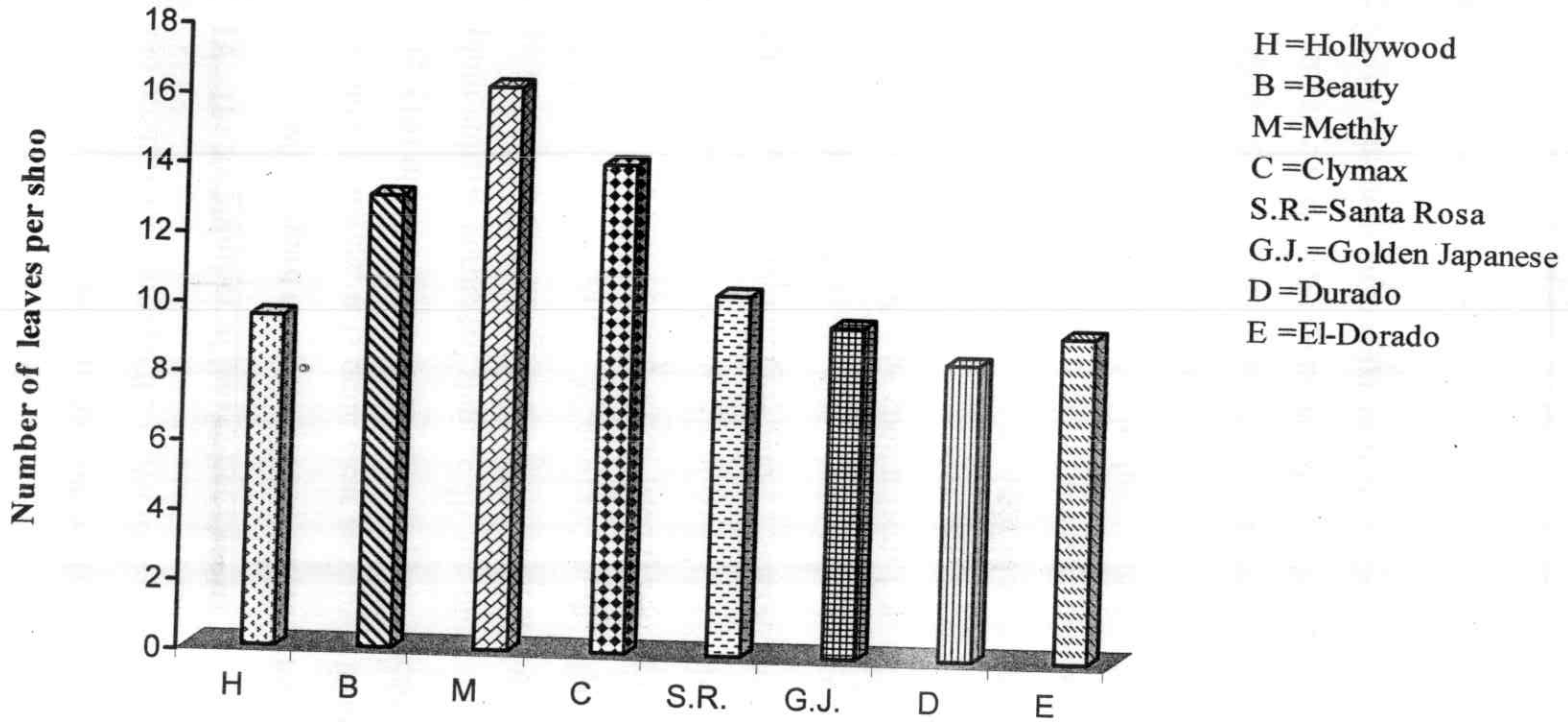

Figure (10): Number of leaves per shoot (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

The present result proved that the number of leaves per shoot is an inheritable stable character not easy to change.

IV - II - 4 – Leaf dry weight:

Regarding the average leaf dry weight, Table (3) displays that Hollywood cultivar had the lighest leaf weight during both seasons, whereas a positive correlationship between number of leaves per shoot and the average leaf dry weight was quite clear with Hollywood cultivar. Contrary to that a noticable negative relationship was detected between number of leaves per shoot and the average dry weight of leaf for Durado; El-Dorado and Golden Japanese cultivars of such three cultivars regarding the least number of leaves per their individual shoot from one hand was corresponded to their superiority pertaining their heavier leaf dry weight from the other. Such trend was true either data of each individual season or an averago of two seasons were concerned.

In addition, Clymax cultivar showed a positive correlation between number of leaves per its own shoots and average dry weight per leaf, while Beauty exhibited a neagative relationship in this respect.

Anyhow, the trend of response was not so firm to be detected during both seasons as shown form Table (3).

Table (3): Some growth measurements of shoot length, trunk diameter, dry weight and number of leaves for the eight japanese plum cultivars evaluated during two successive seasons of 2001 and 2002 seasons

Cultivars	Shoot length increase (cm)			Increment percentage in trunk diameter			Number of leaves per shoot			Leaf dry weight (mgm)		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	32.50de	39.40d	35.95	2.35bc	1.79d	2.07	9.33c	9.67cd	9.50	89.7f	99.0cd	94.35
Beauty	49.97a	60.30b	55.14	2.89a	2.73c	2.81	14.67ab	11.33b	13.00	94.0ef	103.7bc	98.85
Methly	50.37a	69.47a	59.92	2.52b	2.95bc	2.74	16.33a	16.00a	16.17	99.7de	108.0ab	103.85
Clymax	43.77b	61.20b	52.49	13.00b	15.00a	14.00	109.3bc	114.3a	111.80	2.74ab	2.86bc	2.80
Santa Rosa	38.63c	48.03c	43.33	1.91c	3.11b	2.51	10.33c	10.33bc	10.33	111.7b	93.0d	102.35
G. Japanese	35.90cd	40.47d	38.19	2.15bc	2.85bc	2.50	9.33c	9.67cd	9.50	101.3c-e	109.7ab	105.5
Durado	29.37e	33.13e	31.25	2.09c	3.52a	2.81	8.33c	8.67d	8.50	123.0a	105.0bc	114.00
El-Dorado	33.27de	39.03d	36.15	2.08c	2.78c	2.43	9.33c	9.33cd	9.33	105.0b-d	110.3ab	107.65

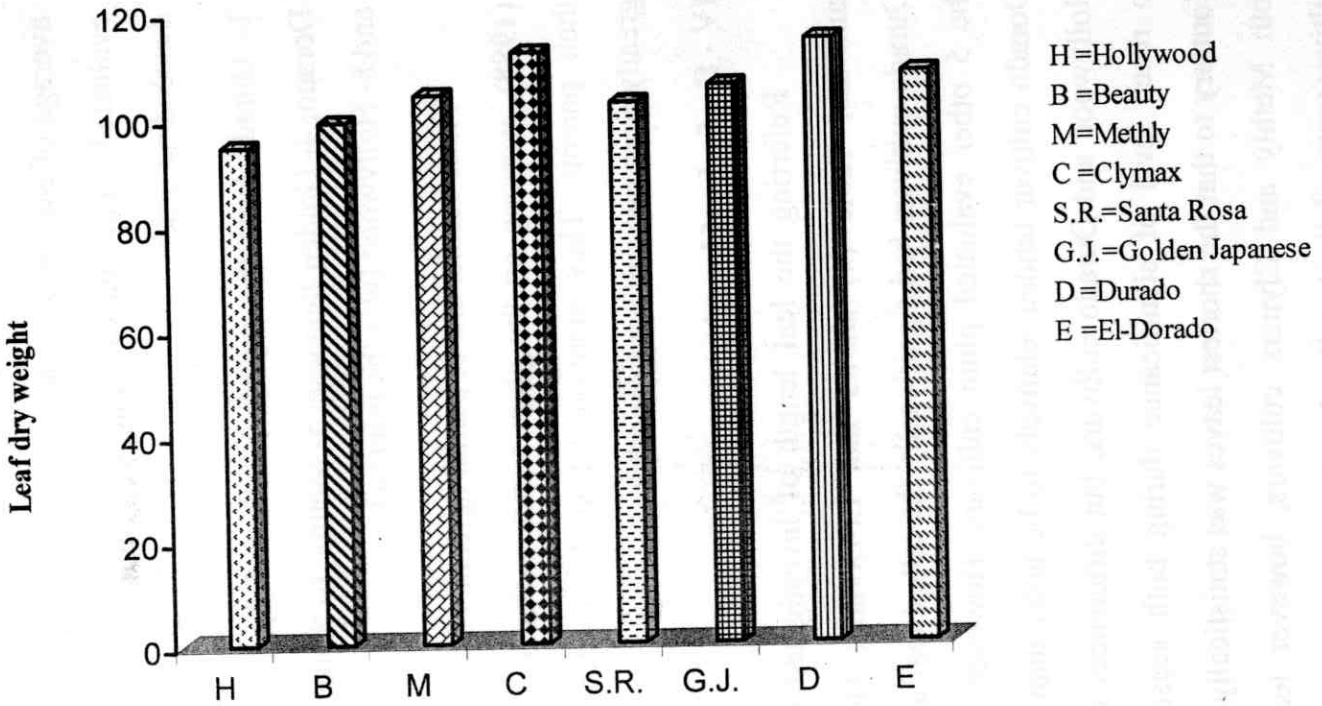

Figure (11): Leaf dry weight (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

On the other hand, it could be safely concluded as an average of two seasons was illustrated in Fig. (11) that the eight evaluated plum cultivars could be arranged into the following descending order:

1- Durado (was the superior) followed by; 2- Clymax; 3- El-Dorado; 4- Golden Japanese; 5- Methly; 6- Santa Rosa; 7- Beauty and 8- Hollywood (was the inferior).

These results are in partial agreement with **Vitanov et al. (1988),** working on the plum varieties Stanley Gabrovska and their parents. They mentioned that dry matter content varied greatly from one cultivar to another.

IV - II - 5 - Leaf length:

Referring the leaf length of investigated japanese plum cultivars, Table (4) shows that El-Dorado; Hollywood and Durado cultivars had significantly the tallest leaf as compared to the 5 other evaluated plum cultivars. However, leaves of El-Dorado cultivar tended relatively to be taller than those of both Hollywood and Durado cultivars, but differences were so slight to reach level of significance during both seasons of study. Contrary to that the shortest leaves was statistically coupled with both Methly and Clymax cultivars, however leaves of later cultivar were relatively taller than those of former one either data of each season or an average of two seasons were compared.

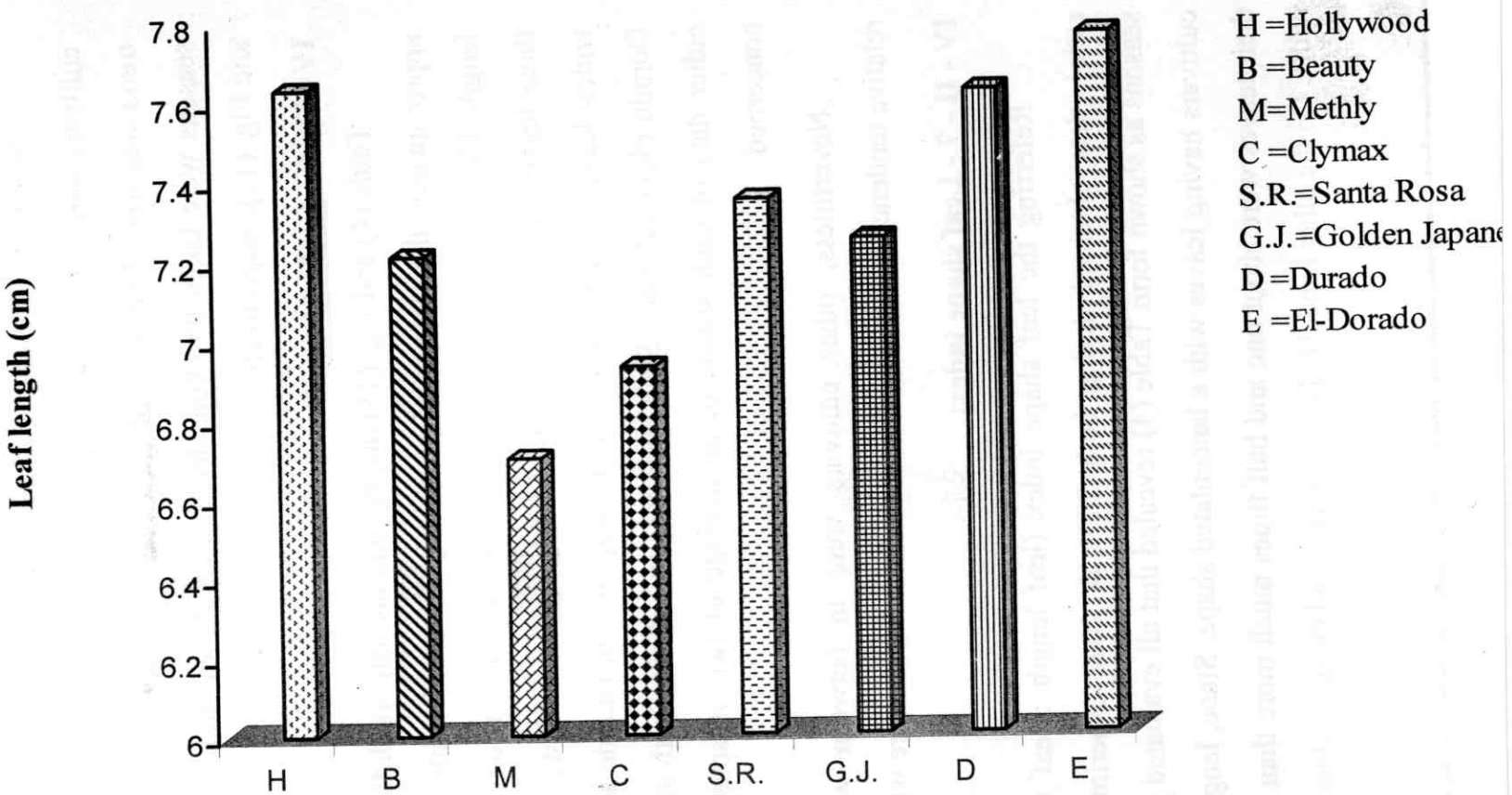

Figure (12): Leaf length (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

Moreover, Beauty; Golden Japanese and Santa Rosa cultivars were in between the aforementioned two extremes. Such trend was true either data of each season or an average of two seasons were taken into consideration as shown from Table (4) and Fig. (12), respectively.

IV - II - 6 – Leaf width:

Table (4) and Fig. (13) display that the leaf width followed approximately the same trend previously discussed with the leaf length. Hence, the narrowest leaf was always in concomitent to those leaves of both Clymax and Methly cultivars. However, the widest leaves were in closed relationship to both Durado and El-Dorado plum cultivars. Such trend was true during both seasons either data of each season or an average of two seasons were concerned.

Neverthless, other cultivars were in between with a relative tendency pointed out that Santa Rosa leaves were wider.

IV - II - 7 - Leaf shape index:

Referring the leaf shape index (leaf length : leaf width ratio), data obtained during both 2001 & 2002 experimental seasons as shown form Table (4) revealed that all evaluated plum cultivars having leaves with a lanceolated shape. Since, length of their leaves were about one and half times much more than their width. On the other hand, Hollywood leaves had the most oblonged

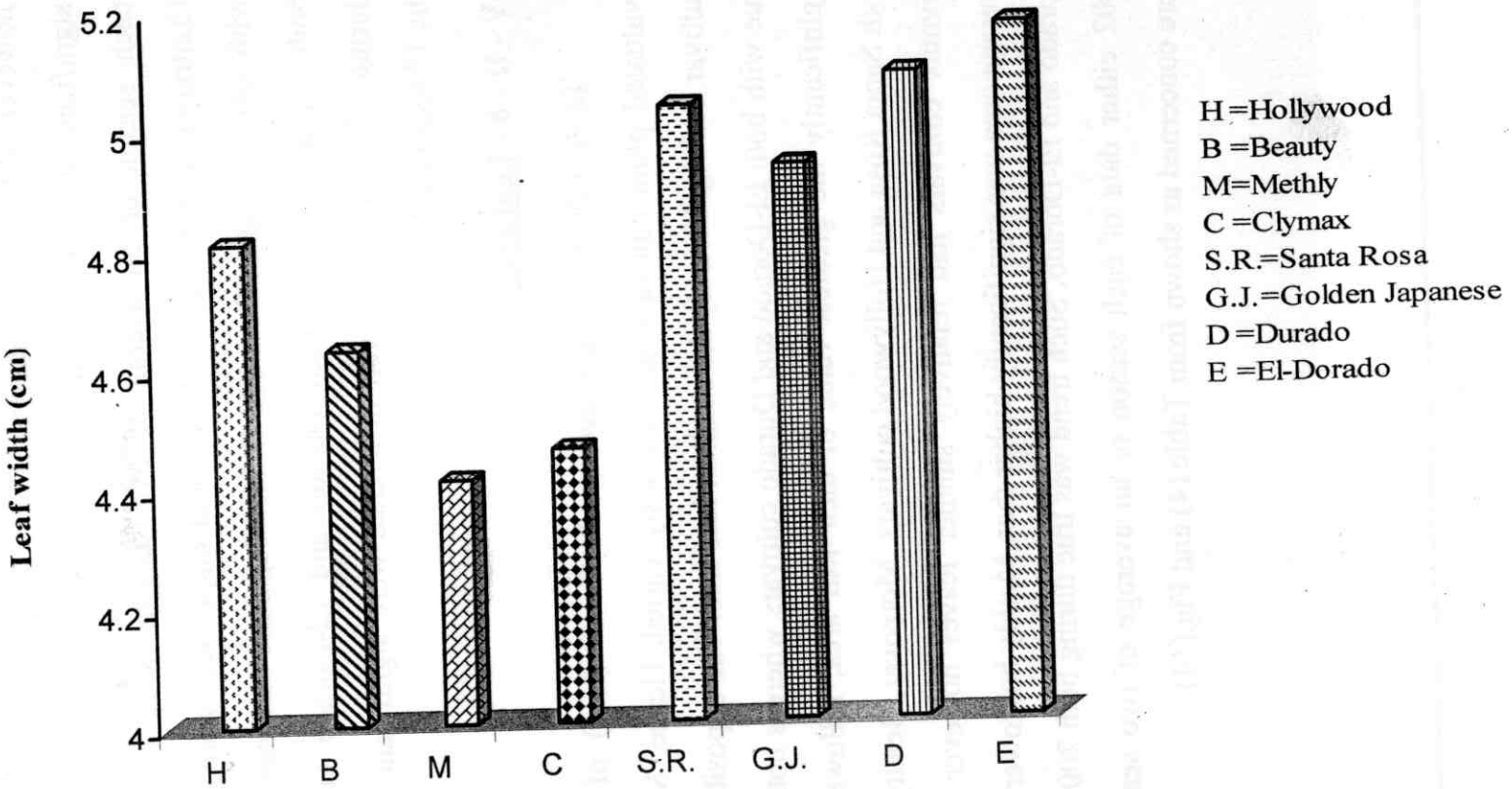

Figure (13): Leaf width (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

leaves followed by those of both Beauty and Clymax cultivars, however differences between these 3 cultivars were not significant during both seasons. Such trend was true either data of each season or an averag of two seasons were concerned. Contrary to that, the least values of leaf shape index were coupled with leaves of Santa Rosa and Golden Japanese cultivars during both seasons, besides both Durado and El-Dorado cultivars during 1st season. However, difference were significant during the 1st season only.

IV - II - 8 - Leaf area:

Table (4) shows that average leaf area (cm^2) of eight evaluated plum cultivars was obviously varied. Hence, Methly cultivar had significantly the smallest leaf area. The opposite was true with both El-Dorado and Durado cultivars whereas both had siginficantly the greatest value of their leaf area, followed by both Santa Rosa and Hollywood cultivars. Moreover, Beauty and Clymax cultivars had relatively smaller leaves however their average area was significantly higher than Methly but lower than Durado and El-Dorado. Such trend was true during both 2001and 2002 either data of each season or an average of two seasons were concerned as shown from Table (4) and Fig.(14).

IV - II - 9 - Leaf area factor:

It is quite clear as shown from data presented in Table (4) that leaf area factor (leaf area ÷ leaf length x leaf width) was relatively varied from one cultivar to another. However, such variance was not too firm especially as data of two seasons were compared, from one hand. On the other hand, it could be concluded that the highest value of leaf area factor was related to leaves of Clymax; Golden Japanese and El-Dorado cultivars.

The reverse was found with Beauty, Methly and Durado cultivars especially in 1st season or as an average of two seasons was concerned.

Anyhow, variances between investigated plum cultivars regarding their leaf area factors were relatively slight whereas they ranged about 0.70. this trend may be due to the variation exhibited in leaf area factor from one seasnon to antohter for the same cultivar, which reflects the specific characteristics of response to the surrounding environmental condition for each individual cultivar.

Table (4): Leaf length; width; shape index; area and area factor for eight japanese plum cultivars evaluated during two successive seasons of 2001 & 2002

Cultivars	Leaf length (cm)			Leaf width (cm)			Leaf shape index			Leaf area (cm^2)			Leaf area factor		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	7.47a	7.79ab	7.63	4.68d	4.93bc	4.81	1.58a	1.59a	1.59	24.57b	27.01b1	25.79	0.70bc	0.70ab	0.70
Beauty	7.13bc	7.28cd	7.21	4.59e	4.67d	4.63	1.57a	1.56ab	1.57	22.99cd	22.96d	22.98	0.70bc	0.68c	0.69
Methly	6.65d	6.75e	6.70	4.31f	4.50e	4.41	1.55a	1.50b	1.53	19.88e	21.38e	20.63	0.69c	0.70ab	0.70
Clymax	6.82cd	7.04de	6.93	4.36f	4.55e	4.46	1.55a	1.55ab	1.55	21.87d	22.41de	22.14	0.72a	0.70ab	0.71
Santa Rosa	7.21ab	7.49bc	7.35	5.09b	4.97bc	5.03	1.42b	1.51ab	1.47	26.20a	25.71c	25.96	0.70bc	0.69a-c	0.70
G. Japanese	7.20ab	7.36cd	7.28	4.98c	4.88c	4.93	1.44b	1.51ab	1.48	25.44bc	25.36c	25.4	0.71ab	0.70ab	0.71
Durado	7.47a	7.76ab	7.62	5.14ab	5.02ab	5.08	1.45b	1.55ab	1.50	26.36a	27.09b	26.73	0.69c	0.69a-c	0.69
El-Dorado	7.53a	7.98a	7.76	5.20a	5.11a	5.06	1.45b	1.54ab	1.50	27.21a	28.53a	27.87	0.70bc	0.71a	0.71

* Leaf shape index = leaf length ÷ leaf width

** Leaf area factor = leaf area cm^2 ÷ (leaf length x leaf width)

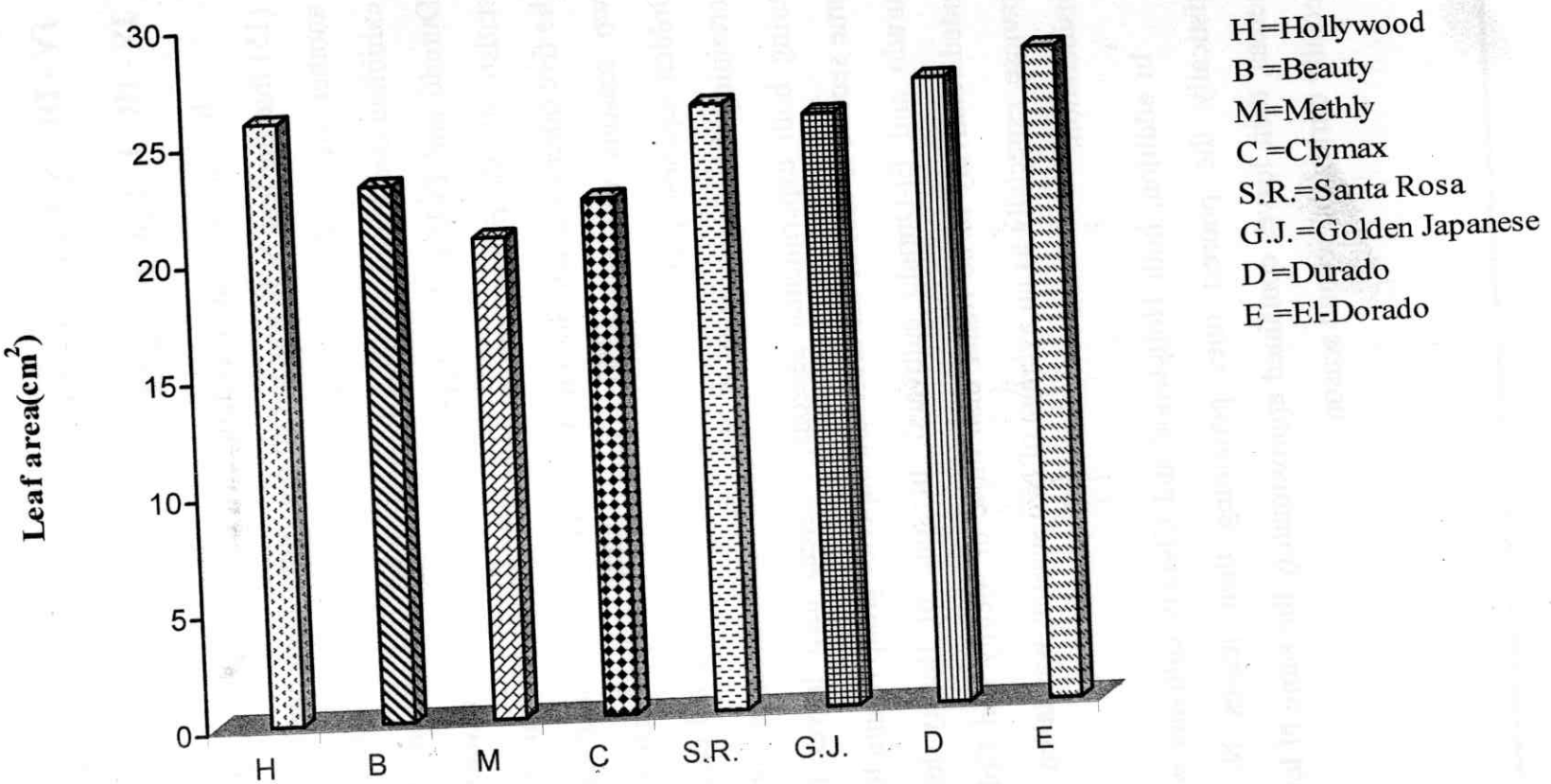

Figure (14): Leaf area (an average of 2001 and 2002 seasons) for the evaluated eight japanese plum cultivars

IV - III - Nutritional status (leaf mineral composition):

IV - III - 1 - Leaf nitrogen content:

It is quite clear from tabulated data in Table (5) and Fig. (15) that the leaf N % was varied obviously from one cultivar to another. Hence, data obtained during both 2001 & 2002 seasons exhibited that leaves of Santa Rosa (in both seasons), as well as Durado and El-Dorado cultivars (especially 2002 season) were statistically the richest ones as their N % level was compared to the five other cultivars. Such trend was also true as the average of two seasons was concerned. Moreover, Beauty; Methly and Golden Japanese plum cultivars represented the second category pertaining their leaves N %. Such trend was to great extent true during both experimental seasons, whereas their leaves N % came second to that of the aforesaid superior group (Santa Rosa; Durado and El-Dorado cultivars). In spite of Beauty leaves tended relatively to be richer than those of Methly and Golden Japanese, especially as an average of two seasons was taken into consideration.

In addition, both Hollywood and Clymax cultivars were statistically the poorest ones pertaining their leaves N %. Whereas, their leaves contained approximately the same N level especially during the second season.

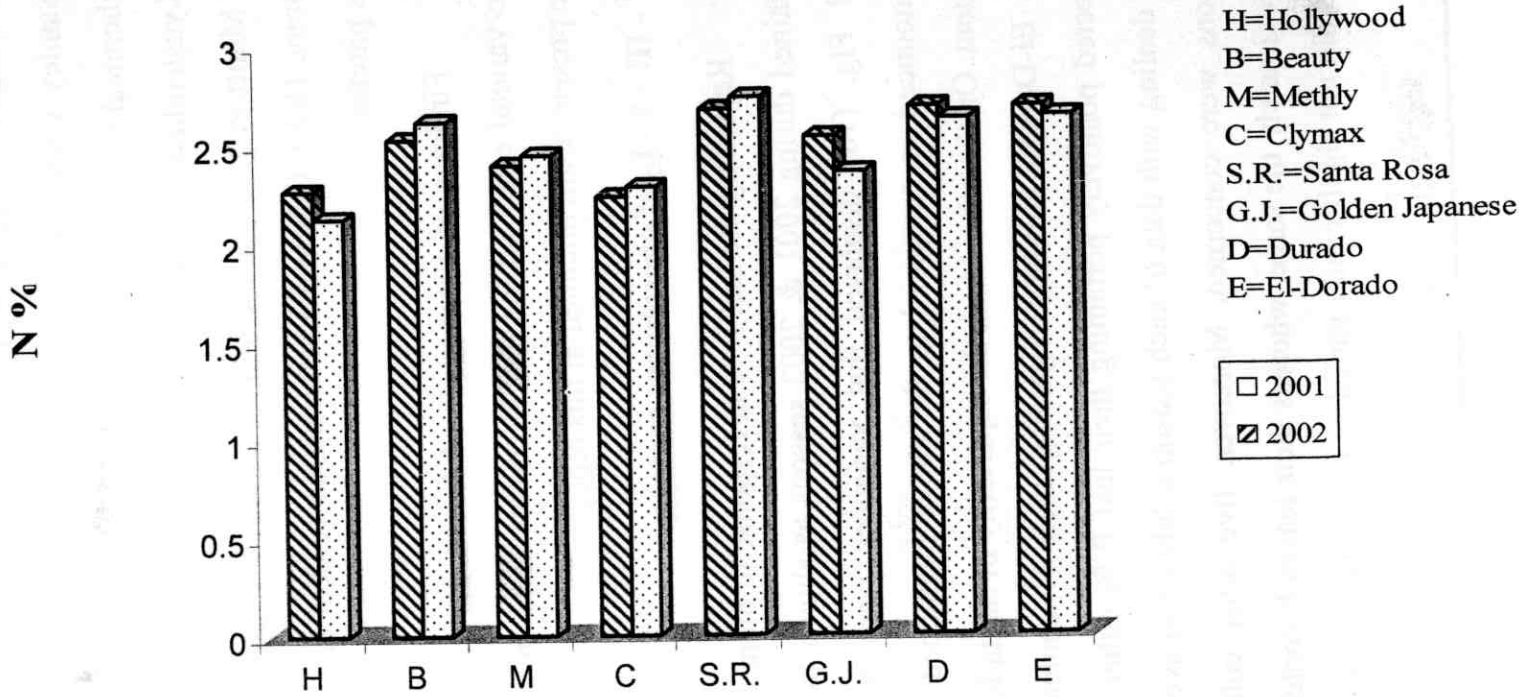

Figure (15): Average leaf N % for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

The obtained results go generally in the line with the findings of **Vitanova et al. (1988)** working on the plum varieties Stanley Gabrovska and their parents. They mentioned that the chemical composition of the leaves in Gabrovska and its parents Kyustendilska Sinya { Kyustendil blue } and Monforska { Montfort } in Stanley and its parents Azhanska { Agen } and Grand Duke. Gabrovska had a higher content of N in leaves than its parents.

Findings of **Vitanova and Bozhkova (1995),** pertaining the varietal effect on the leaf N content of plum trees supported the present result obtained in this repect.

IV - III - 2 - Leaf phosphorus content:

Regarding the leaf P % in response to plum cultivars, data obtained during 2001 & 2002 seasons as shown from Table (5) and Fig. (16) displayed that variances were relatively less pronounced as compared to the above mentioned with leaf N content. On the other hand, the superiority of Santa Rosa; Durado and El-Dorado cultivars regarding their N content was also reflected positively pertaining their leaf P % either comparison was dealing with data of each season solely or an average of two seasons were concerned. Moreover, five other cultivars were approximately the same, whereas their leaves P contents in most cases did not significantly varied as compared each other, except

Methly which tended to be slightly richer, especially in the second season.

Accordingly, it could be safely concluded depending upon the data representing the average of two 2001 & 2002 seasons as shown from Table (5) and Figure (16) regarding the leaf P % that the eight evaluated cultivars could be arranged into the following descending order: El-Dorado; Santa Rosa and/or Durado ranked 1st, followed by Methly; Clymax and (Golden Japanese; Beauty and Hollywood) which ranked 2nd, 3rd and 4th, respectively.

The present results are in general agreement with the findings of **Vitanova et al. (1988),** working on the plum varieties Stanley Gabrovska and their parents. They mentioned that the chemical composition of the leaves was studied in Gabrovska and its parents Kyustendilska Sinya { Kyustendil blue } and Monforska { Montfort } in Stanley and its parents Azhanska { Agen } and Grand Duke. Gabrovska had a higher leaf content than its parents.

Vitanova and Bozhkova (1995), studied the effect of variety on the content of some mineral elements in the leaves of plum trees. The fininding regarding the varietal variances in P content goes in the line with our result in this concern.

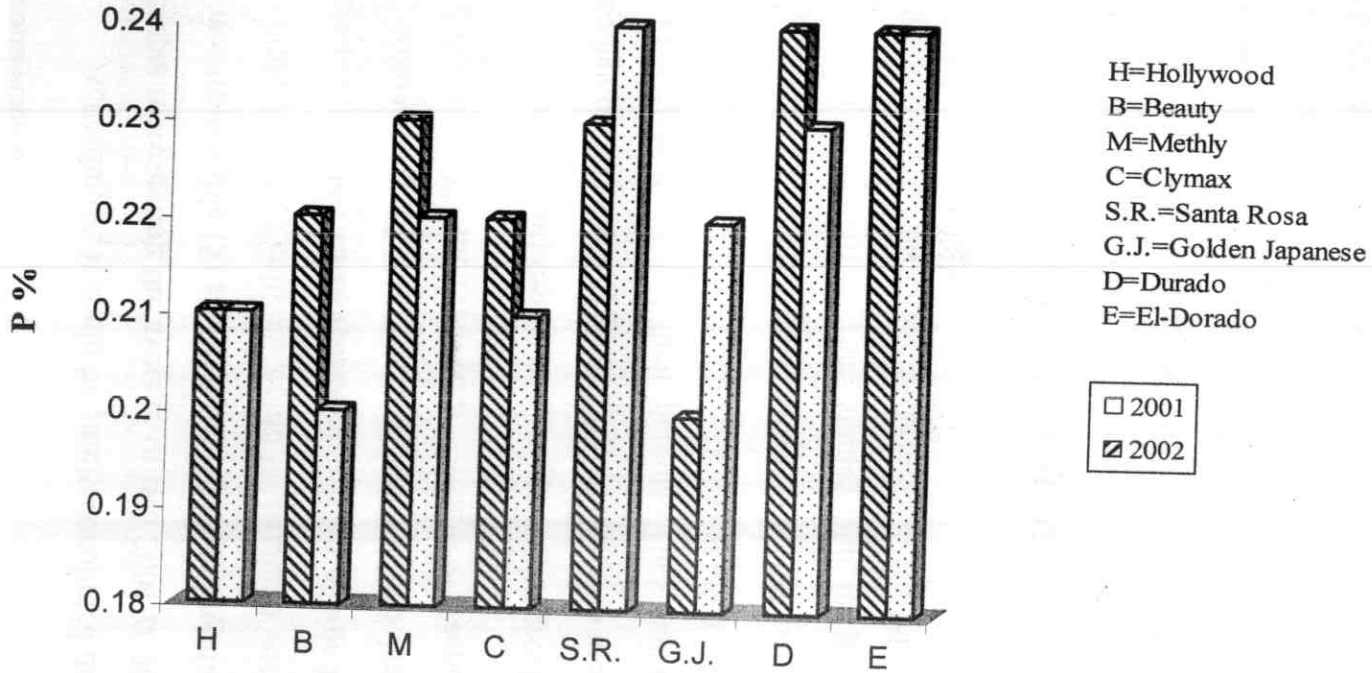

Figure (16): Leaf P % for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

IV - III - 3 - Leaf potassium content:

Table (5) displays that leaf K % tended to be a specific interested characteristic of the eight evaluated plum cultivars. Whereas the leaf potassium level of Santa Rosa, Golden Japanese and El-Dorado cultivars was statistically the highest as compared to the other evaluated ones, especially during the first 2001 season for the two former cultivars but during both seasons for the latest one. Moreover, such trend was also true as an average of two seasons was concerned through comparison.

Nevertheless, Beauty; Methly; Clymax and Durado cultivars were to great extent equally regarding their leaves K content, especially as an average of two seasons was concerned. However, some exceptions could be noticed, whereas the Beauty leaf K % was the least in 1st season and richest one after El-Dorado in the second season. However, Methly cultivar showed an opposite trend to that detected for Beauty whereas its leaves were relatively richer in 1st season but showed the least level in 2nd season regarding leaf K %. Meanwhile, two other cultivars of such groups showed comparable values during both seasons. Whereas, the level of potassium percentage for each cultivar during a given season was coincided to the anologus value obtained in the other one.

Table (5): Leaf N, P and K % of eight japanese plum cultivars evaluated during two successive 2001 and 2002 seasons

Cultivars	N %			P %			K %		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	2.12e	2.26cd	2.19	0.210c	0.210de	0.210	1.25c	1.25b	1.25
Beauty	2.61b	2.52ab	2.57	0.200c	0.220b-d	0.210	1.24c	1.32ab	1.28
Methly	2.44c	2.39bc	2.42	0.220bc	0.230a-d	0.225	1.31b	1.25b	1.28
Clymax	2.28d	2.23d	2.26	0.210c	0.220b-d	0.215	1.28bc	1.27b	1.27
Santa Rosa	2.73a	2.67a	2.70	0.240a	0.230a-d	0.235	1.42a	1.24b	1.33
G. Japanese	2.35cd	2.53ab	2.44	0.220bc	0.200e	0.210	1.34ab	1.26b	1.30
Durado	2.62b	2.68a	2.65	0.230ab	0.240a	0.235	1.27bc	1.28b	1.27
El-Dorado	2.63b	2.68a	2.66	0.240a	0.240a	0.240	1.34ab	1.38a	1.36

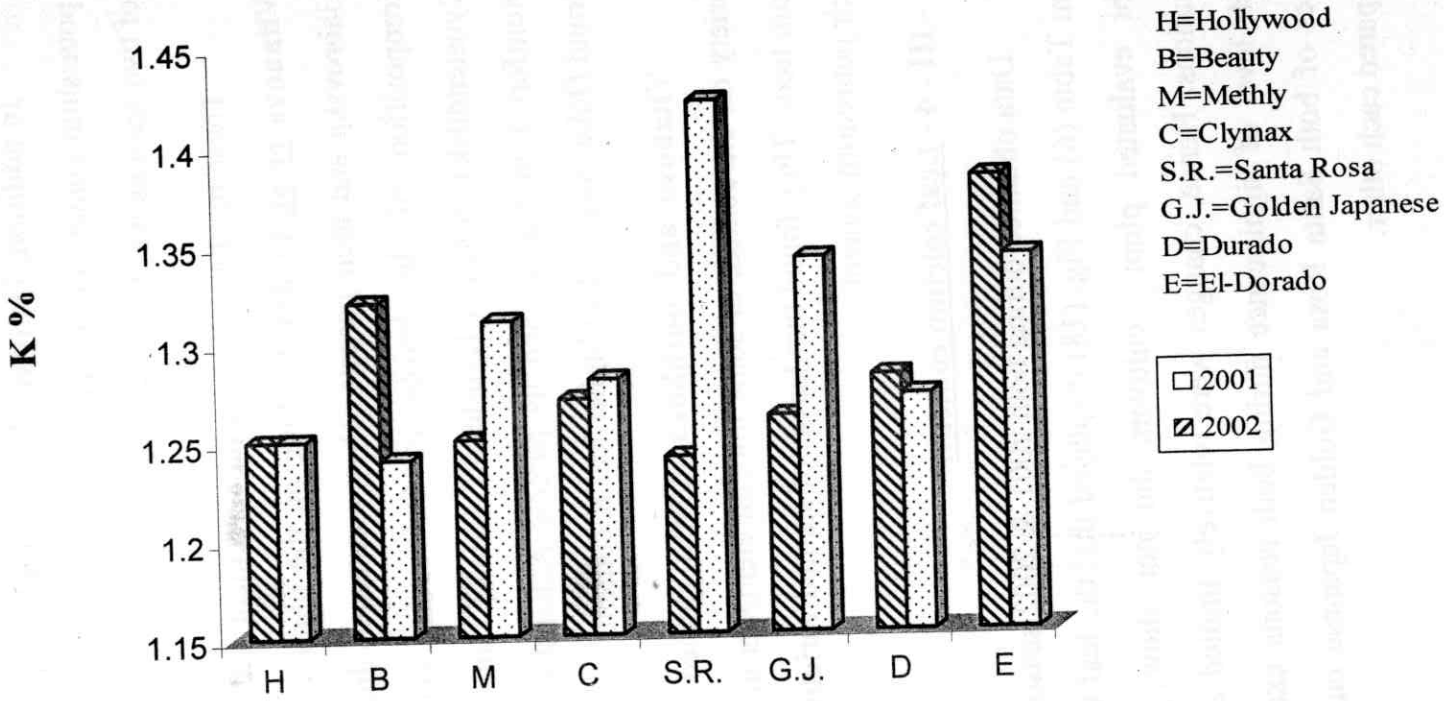

Figure (17): Leaf K % for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

In addition, Hollywood leaves ranked last regarding their potassium content during both seasons, especially as an average of two seasons was taken into consideration.

These results are in general agreement with the findings of **Vitanova et al. (1988),** working on the plum varieties Stanley Gabrovska and their parents. They mentioned that the chemical composition of the leaves in Gabrovska and its parents Kyustendilska Sinya { Kyustendil blue } and Monforska { Montfort } in Stanley and its parents Azhanska { Agen } and Grand Duke. Stanley had higher leaf K content.

Vitanova and Bozhkova (1995), studied the effect of variety on the content of some mineral elements in the leaves of plum trees. They found that leaves of studied varieties differed in their potassium content.

IV - III - 4 - Leaf calcium content:

Data obtained during both 2001 & 2002 seasons as shown from Table (6) and Fig. (18) displayed that the leaf Ca % of the eight evaluated plum cultivars did not show pronounced variations. Hence, changes were relatively limited and did not reach level of significance during both seasons except as the leaves of both Santa Rosa and Golden Japanese cultivar were compared each other.

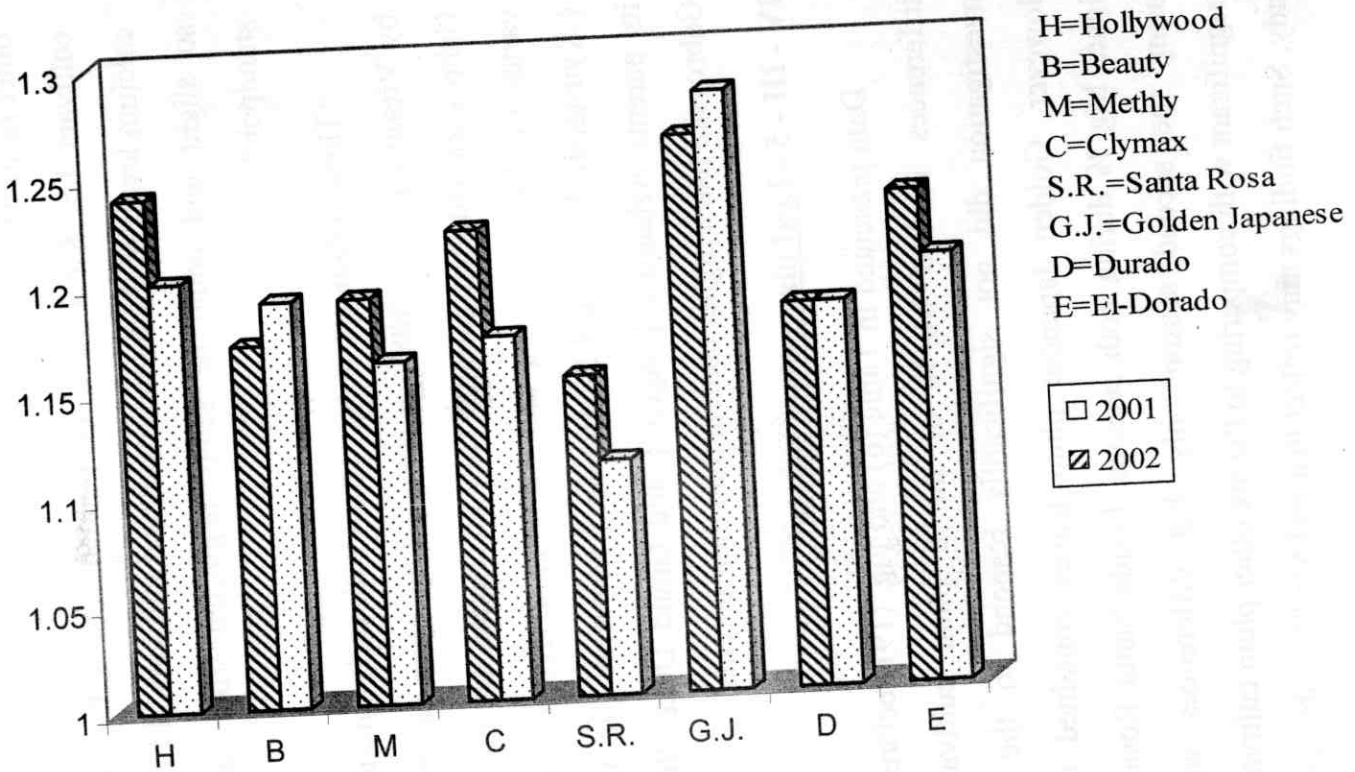

Figure (18): Leaf Ca % for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

Hence, leaves of Golden Japanese exceeded statistically those of Santa Rosa cultivar during both seasons of study. On the other hand with comparing leaf Ca % of any of the aforesaid two cultivars i.e. Santa Rosa or Golden Japanese individually to calcium levels of the 6 other evaluated cultivars, differences were so slight and could be safely neglected from the statistical standpoint.

These results are in agreement with early findings reported by **Vitanov et al. (1988),** working on the plum varieties Stanley Gabrovska and their parents. They mentioned that the Ca content varies of the Gabrovska and its parents Kyustendilska Sinya { Kyustendil blue } and Monforska { Montfort } in Stanley and its parents Azhanska { Agen } and Grand Duke. Stanley and Gabrovska had a higher content than their parents.

IV - III - 5 - Leaf magnesium content:

Data presented in Table (6) and Fig. (19) declared that the differences in leaf Mg % of the 8 plum cultivars under investigation did not significantly respond to the cultivar. However, Golden Japanese plum leaves contained relatively higher Mg % during both seasons, beside Santa Rosa cultivar during the second season only, but differences were still insignificant with comparing to the six other plum cultivars under study. Such findings may reflect that leaf Mg % could not be

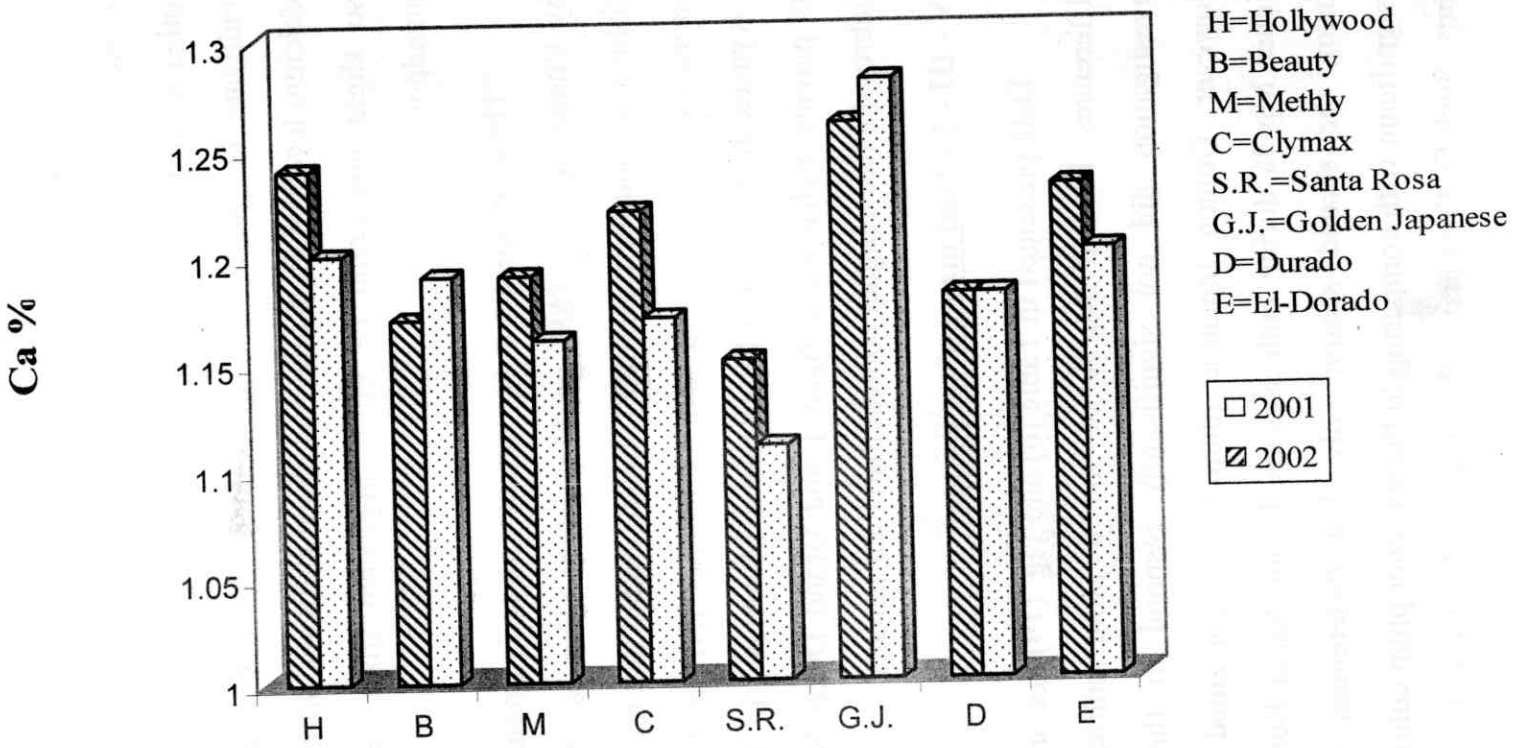

Figure (18): Leaf Ca % for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

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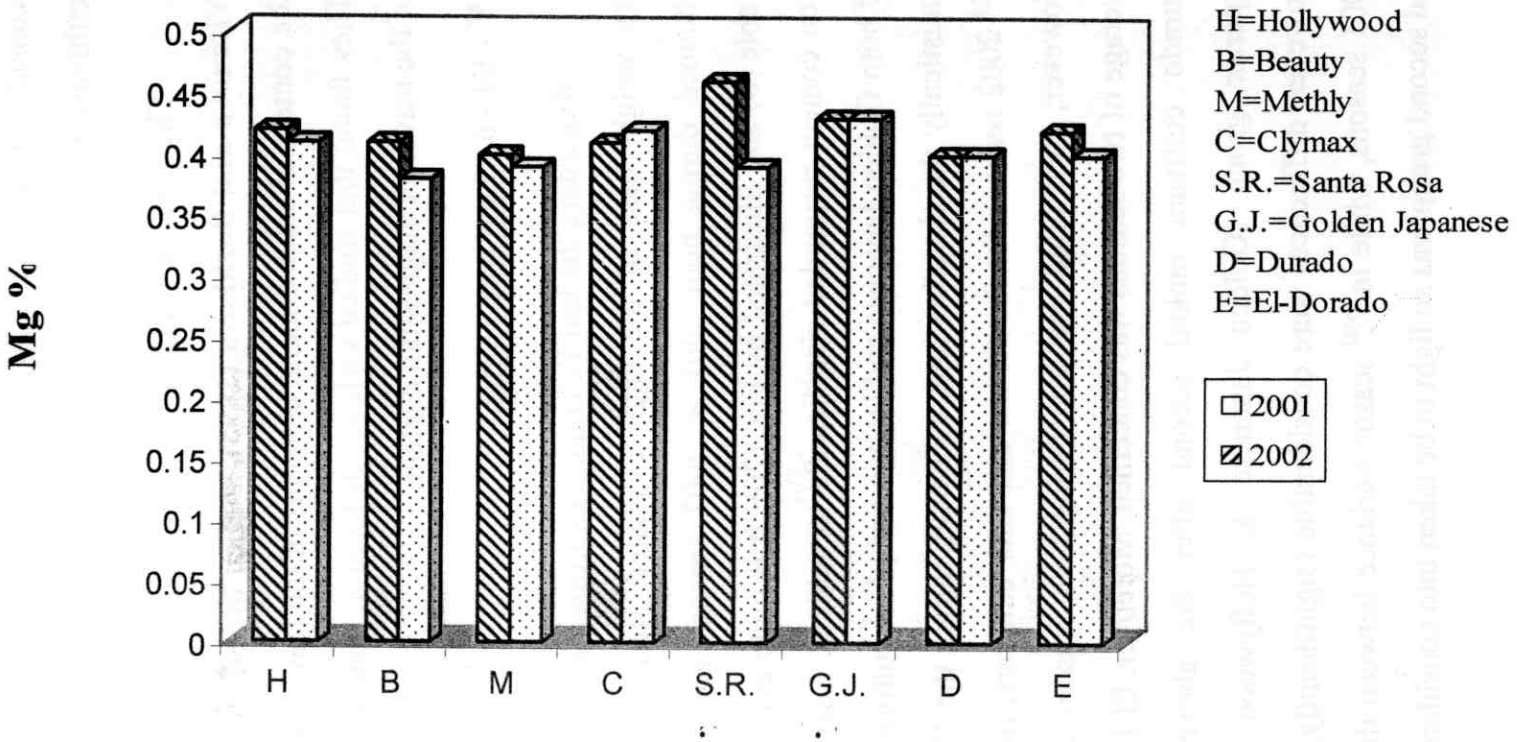


Figure (19): Leaf Mg % for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

considered as a stable characteristic at least for the eight plum cultivars under study.

The present result is in agreement with the findings of **Vitanova and Bozhkova (1995),** studied the effect of variety on the content of some mineral elements in the leaves of plum trees. They found that studied varieties differed in mineral composition of the leaves of magnesium content.

IV - III - 6 - Leaf iron content:

Regarding the leaf Fe content expressed as ppm on the leaf dry weight base of the eight evaluated plum cultivars, data obtained during both 2001 & 2002 seasons are presented in Table (6) and illustrated by Fig. (20). It is quite evident that leaf iron content responded significantly to cultivar. Leaf Fe content of both Golden Japanese and Hollywood plum cultivars exceeded statistically the six other ones especially during the 1st 2001 and 2nd 2002 seasons for the former and later cultivars, respectively. However, such trend was true during both seasons even as an average of two seasons was concerned. Moreover, El-Dorado and Durado cultivars ranked second after the abovementioned superior group (Golden Japanese & Hollywood cultivars). However, differences were considerable (significantly) in the 1st 2001 seasons, while in 2nd season variance between the superior and second group was so light to be taken into consideration from

Table (6): Leaf Ca, Mg and Fe contents of eight japanese plum cultivars evaluated during two successive 2001 and 2002 seasons

Cultivars	Ca %			Mg %			Fe (ppm)		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	1.20ab	1.24ab	1.22	0.41a	0.42a	0.415	159.3ab	165.7a	162.5
Beauty	1.19ab	1.17ab	1.18	0.38a	0.41a	0.395	125.3e	135.0cd	130.2
Methly	1.16ab	1.19ab	1.18	0.39a	0.40a	0.395	130.7c-e	136.3b-d	133.5
Clymax	1.17ab	1.22ab	1.20	0.42a	0.41a	0.415	139.3 c-e	144.0b-d	141.7
Santa Rosa	1.11b	1.15b	1.13	0.39a	0.46a	0.425	127.7de	126. 7d	127.2
G. Japanese	1.28a	1.26a	1.27	0.43a	0.43a	0.430	169.00a	155.3a-c	162.2
Durado	1.18ab	1.18ab	1.18	0.40a	0.40a	0.400	145.7b-d	151.3a-c	148.5
El-Dorado	1.20ab	1.23ab	1.22	0.40a	0.42a	0.410	147.0bc	157.7ab	152.4

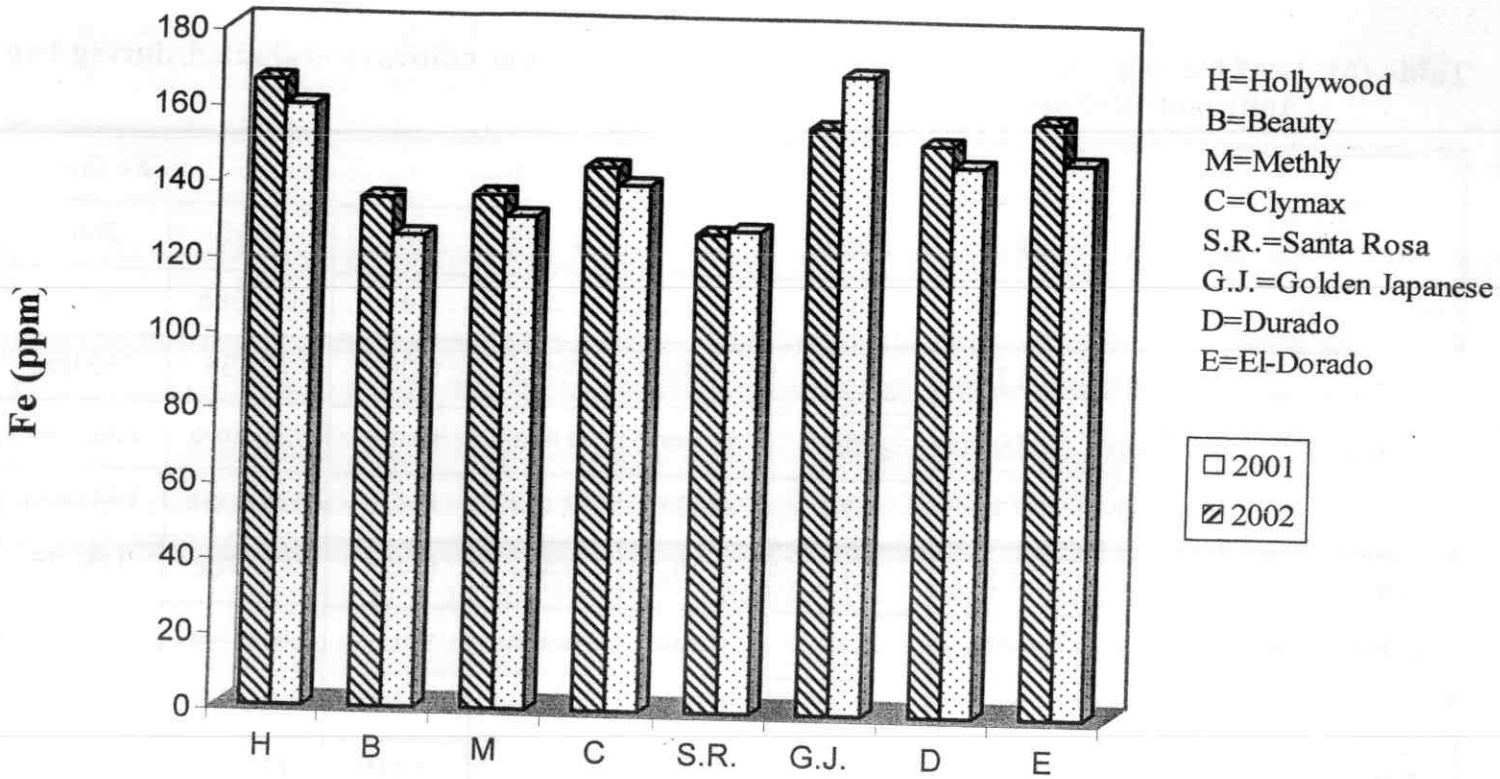


Figure (20): Leaf Fe (ppm) for eight evaluated japanese plum cultivars during 2001 and 2002 seasons

the statistical point of view. In spite of the variance between such two groups were still obviously noticeable.

On the contrary, leaves of Santa Rosa; Beauty and to great extent Methly cultivars showed statistically the lowest iron level, especially the former cultivar. Such trend was true during both seasons for Santa Rosa cultivar and 1st season for Beauty cultivar, as well as when average of two seasons had been taken as the comparison base for nearly these three cultivars. In addition, Clymax plum leaf Fe content was in between the abovementioned two extents, either the data of each individual season or an average of both seasons were concerned.

IV - III - 7 - Leaf zinc content:

Table (7) and Fig. (21) show that leaf zinc content was relatively varied from one cultivar to another. However, the degrees of variances were not significant in most cases of comparison. The unique exception to the abovementioned trend is represented by the comparison between the zinc leaf content of Santa Rosa cultivar form one hand and those of both Methly and EL-Dorado cultivars from the other, whereas differences were significant during both seasons of study. In other words, leaf Zn contents of both El-Dorado and Methly cultivars surpassed significantly Santa Rosa cultivar during both 2001 & 2002 seasons. Meanwhile differences between leaf Zn content of the 5 other plum

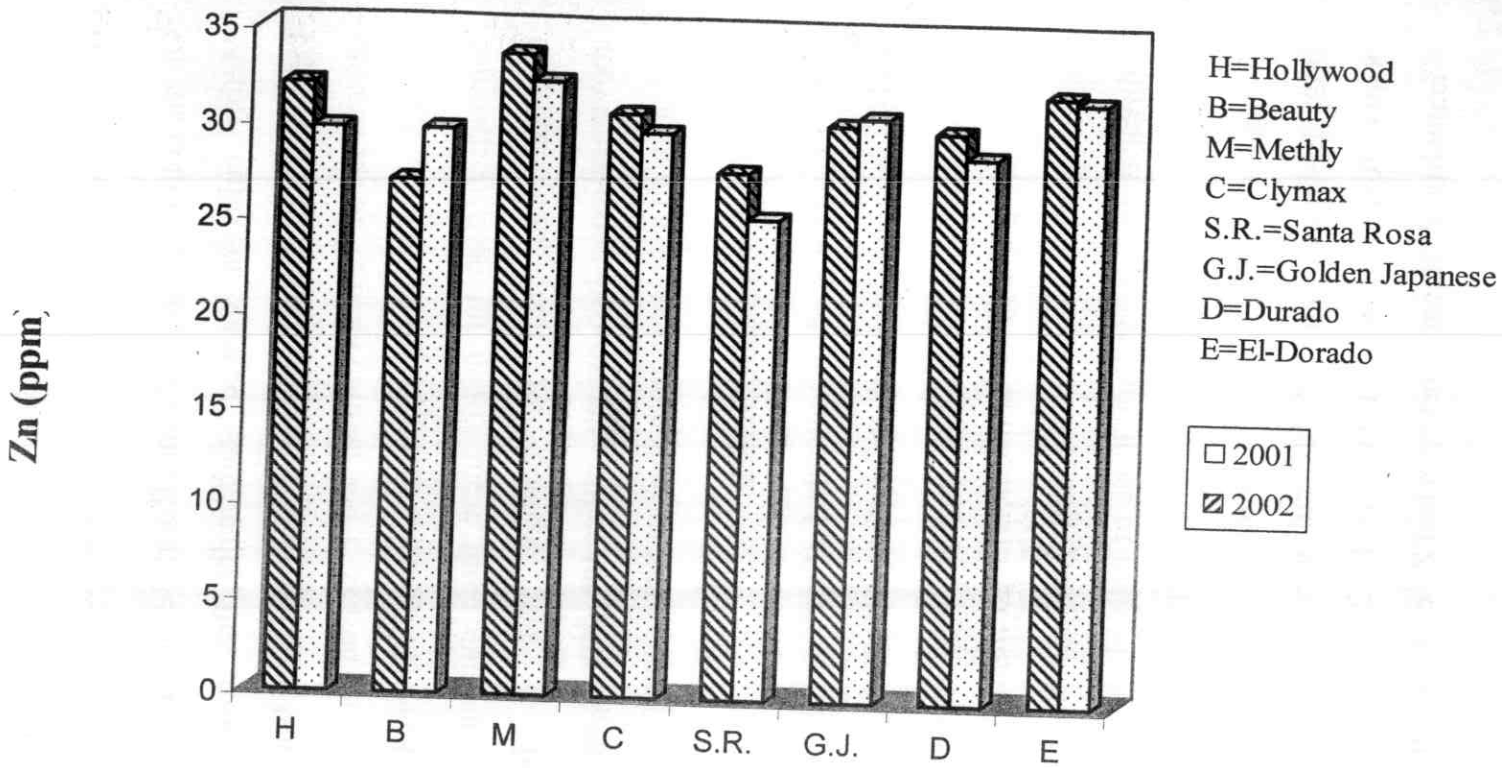


Figure (21): Leaf Zn (ppm) for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

cultivars either compared each other from one hand or to the aforesaid 3 cultivars from the other did not reach level of significance during two seasons of study.

In addition, as an average of two seasons was concerned, eight evaluated plum cultivars could be descendingly arranged according to their leaves Zn content into the following disorder:

Methly; El-Dorado; Hollywood; Golden Japanese; Clymax; Durado; Beauty and Santa Rosa cultivars, which ranked last and its leaves showed the least zinc level.

IV - III - 8 - Leaf manganese content:

Concerning the leaf Mn content (ppm) of the eight evaluated plum cultivars during both 2001 & 2002 seasons, data obtained are presented in Table (7) and illustrated by Fig. (22). It was so clear that no considerable differences were detected between the studied cultivars pertaining their leaf Mn content. All evaluated plum cultivars showed typically the same level during both seasons of study from the statistical point of view.

The present result is in agreement with **Vitanov et al. (1988),** working on the plum varieties Stanley Gabrovska and their parents. They mentioned that the chemical composition of the leaves was studied in Gabrovska and its parents Kyustendilska Sinya { Kyustendil blue } and Monforska

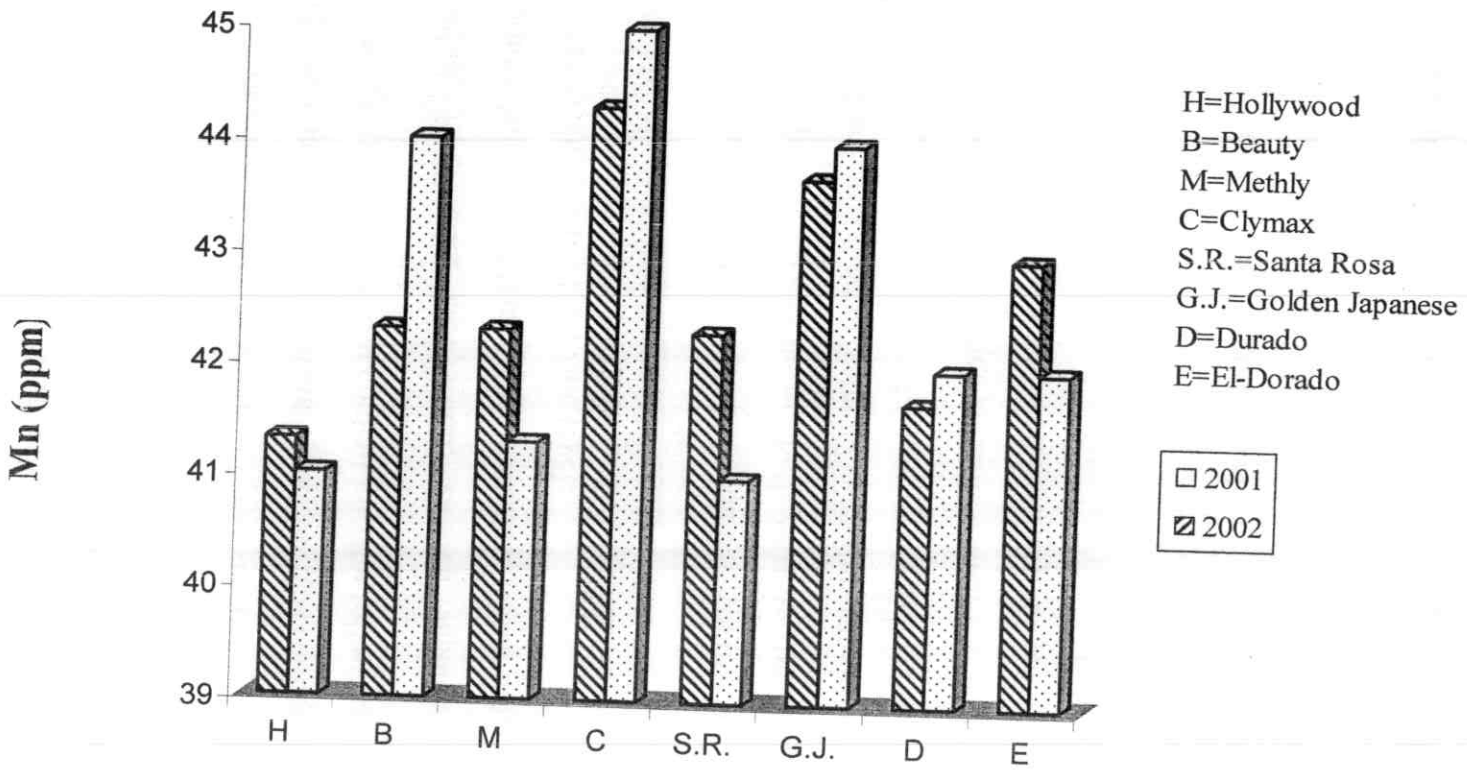


Figure (22): Leaf Mn (ppm) for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

{ Montfort } in Stanley and its parents Azhanska { Agen } and Grand Duke. Stanley had higher Mn content in leaves than its parents.

Vitanova and Bozhkova (1995), studied the effect of variety on the content of some mineral elements in the leaves of plum trees. They found that studied varieties differed in mineral composition of the leaves of manganese content.

IV - III - 9 - <u>Leaf copper content:</u>

Table (7) and Fig. (23) display that leaf Cu content of 8 evaluated plum cultivars showed slight differences. The variances due to cultivars were so limited to be taken into consideration, whereas leaf Cu levels for all plum cultivars ranged about 10.00 ppm during both seasons of study.

Such result reflects that copper content in all cultivars leaves rounded about the optimum range reported by several investigators.

Table (7): Leaf Zn, Mn and Cu contents of eight japanese plum cultivars evaluated during two successive 2001 and 2002 seasons

Cultivars	Zn (ppm)			Mn (ppm)			Cu (ppm)		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	29.7ab	32.0a	30.8	41.0a	41.3a	41.2	10.0a	9.7b	9.8
Beauty	29.7ab	27.0b	28.5	44.0a	42.3a	43.2	10.7a	10.0ab	10.3
Methly	32.3a	33.7a	33.0	41.3a	42.3a	41.8	11.0a	10.7a	10.8
Clymax	29.7ab	30.7ab	30.2	45.0a	44.3a	44.7	9.7a	9.7b	9.7
Santa Rosa	25.3b	27.7 b	26.5	41.0a	42.3a	41.7	10.3a	10.7a	10.5
G. Japanese	30.7a	30.3ab	30.5	44.0a	43.7a	43.8	10.3a	10.3ab	10.3
Durado	28.7ab	30.0ab	29.3	42.0a	41.7a	41.8	10.3a	10.0ab	10.2
El-Dorado	31.7a	32.0a	31.8	42.0a	43.0a	42.5	10.3a	10.7a	10.5

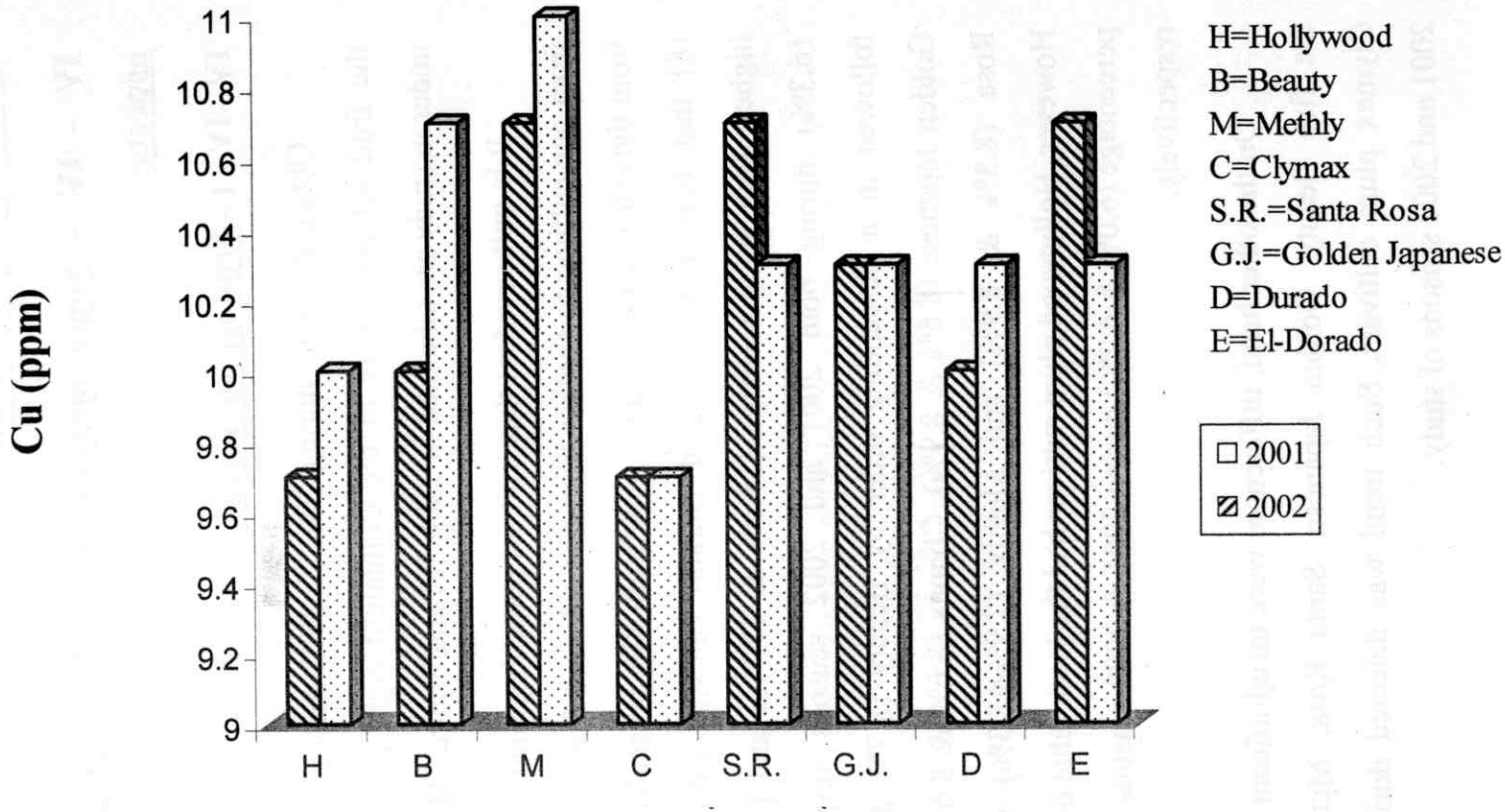


Figure (23): Leaf Cu (ppm) for evaluated eight japanese plum cultivars during 2001 and 2002 seasons

IV - IV – Some measurements of fruiting/cropping aspects:

IV - IV - 1 - Fruit set percentage:

Obtained results during 2001 & 2002 seasons concerning the fruit set percentage of the evaluateld eight plum cultivars under in study are tabulated in Table (8) and Figure (24).

It is quite evident that fruit set percentage had been varied from one cultivar to another from one side and from year to year from the other. This was quite clear from data presented in Table (8) that both El-Dorado and Durado cultivars exhibited the highest fruit set percentage (18.1% & 17.7%) and (16.3% & 16.3%) during both 2001 and 2002 seasons respectively, followed in a descending order by Beauty (8.7% & 8.9%), Golden Japanese (8.6% & 8.9%), Clymax (8.6% & 8.6%) Santa Rosa (8.3% & 8.9%) and Methly (7.9%&8.3%) cultivars. However, Hollywood plum cultivar had the least value of fruit set percentage (6.0% & 6.2%) during 2001 & 2002 seasons of study, respectively.

On the other hand, differences were insiginificant between the five Beauty, Golden Japanese, Santa Rosa, Methly and Clymax plum cultivars. Such trend was detected during both 2001 and 2002 seasons of study.

It could be safely concluded that the Hollywood cultivar exhibited statistically the lowest fruit set, while the reverse was detected by El-Dorado and Durado cultivars whereas both showed higher fruit set % approximately three times much more than Hollywood during both seasons. Moreover, five other cultivars i.e. Beauty; Methly; Clymax; Santa Rosa and Golden Japanese showed equally the same fruit set % form one hand and ranked intermediate as compared to the abovementioned two extents (superior & inferior ones) from the statistical point of view during both seasons of study.

This result is in magnitude with the findings of **Abd El-Aziz et al. (1989),** who indicated that the highest percentage of fruit set was recorded for Kelsey, followed by Mariposa in the two seasons of study. However Howard Miracle produced the lowest percentage of fruit set, Durado and El-Dorado cultivars came in between. Moreover, **Saeid et al. (1993),** working on some plum cultivars, found that the highest fruit set percentage was detected by Golden Japanese, followed by Clymax, Methly, Santa Rosa and Hollywood, respectively.

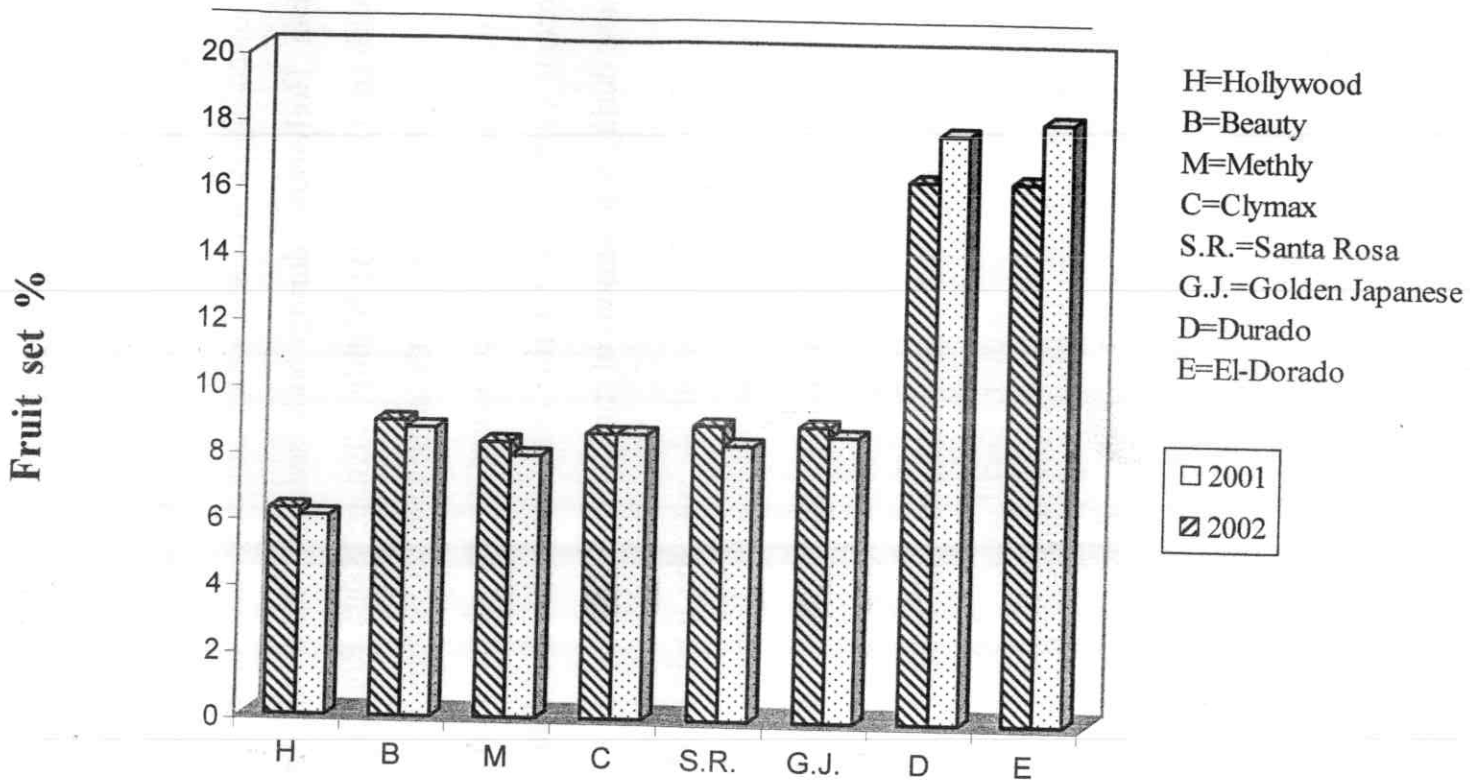


Figure (24): Fruit set % for eight evaluated plum cultivars during 2001 and 2002 seasons

IV - IV - 2 - Fruit yield:

Data obtained during both 2001 and 2002 seasons of study as shown from in Table (8) and illustrated by Fig. (25) revealed obviously that the average yield estimated as Kg per tree of the eight investigated plum cultivars had varied greatly from one cultivar to another and from season to other. However, the heaviest yield (Kg/tree) was always in a significant relationship to the El-Dorado cultivar. On the contrary, the lightest crop was significantly in closed relationship to those of Methly plum trees. On the other hand, Durado, Santa Rosa and Golden Japanese plum cultivars ranked statistically second to the superior cultivar, while Hollywood and both (Beauty & Clymax) cultivars came descendingly third and fourth from the standpoint of statistic, respectively. Such trend was true during both 2001 and 2002 seasons of study.

As for fruit yield calculated as number of fruits per tree, it could be noticed clearly from data represented in the same Table (8) during both seasons of study that the highest value of number of fruits per tree was significantly gained by Beauty, Methly and Clymax plum cultivars. However, differences between two former cultivars were not significant during both seasons; in spite of Clymax cultivar produced also a similar number of fruits per tree during the 1st season only. Moreover, both Durado and El-Dorado

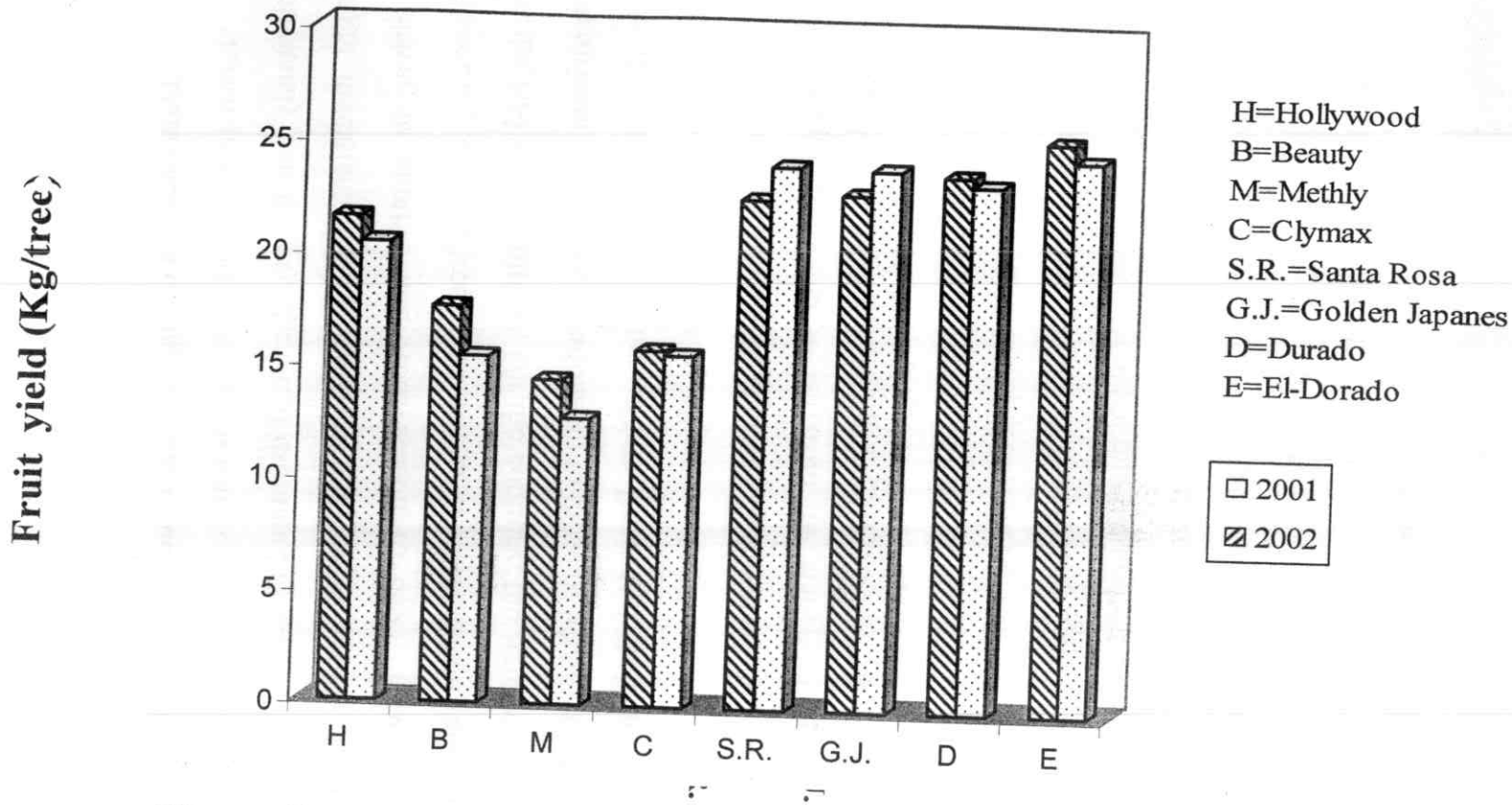


Figure (25): Yield expressed as fruits weight in Kg per tree for eight evaluated plum cultivars during 2001 and 2002 seasons

cultivars showed significantly the lowest value of yield expressed as number of fruits per tree. In addition, other plum cultivars under study i.e. Hollywood and both Golden Japanese and Santa Rosa were in between the abovementioned two extents in this concern.

Nevertheless, the trend of response regarding the yield expressed either as Kg/tree or number of harvested fruits per tree followed two opposite trends. In other words, the greatest number of a given measurements for specific cultivar was coincided with the lowest value of the other parameter. This results could be logically explained depending upon the average fruit weight, whereas the Santa Rosa exhibited the heaviest fruit while Beauty; Methly and Clymax cultivars had the highest fruit weight.

The obtained results go in line with that reported by **Abd El-Aziz et al. (1989),** working to evaluate of five plum cultivars. They reported that both Mariposa and El-Dorado were more productive cultivars and gave significantly the highest yield (19.00 and 20.33 kgs/tree) for Mariposa in the first and second seasons, respectively and the average yield for El-Dorado was (16.00 and 19.33 kgs/tree) in the two seasons, respectively. On the other hand, finding of the same investigator is in disagreement for Durado cultivar as showed that it gave the lowest amount (6.66 and 8.00 kgs/tree) in the two seasons respectively.

Table (8): Fruit set percentage and fruit yield expressed either as weight (kg) or number of fruits per tree for eight japanese plum cultivars evaluated during 2001 and 2002 seasons

Cultivars	Fruit set %			Fruit yield (Kg/tree)			Fruit yield (No. of fruits/tree)		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	6.0c	6.2c	6.1	20.4c	21.5d	20.9	499bc	497b	498
Beauty	8.7b	8.9b	8.8	15.4d	17.6e	16.5	553a	587a	570
Methly	7.9b	8.3b	8.1	12.7e	14.4g	13.6	534ab	600a	567
Clymax	8.6b	8.6b	8.6	15.6d	15.8f	15.7	529ab	512b	521
Santa Rosa	8.3b	8.9b	8.6	24.1ab	22.6c	23.6	464c	446c	455
G. Japanese	8.6b	8.9b	8.7	24.0ab	22.9c	23.4	476c	462c	469
Durado	17.7a	16.3a	17.0	23.4b	23.8b	23.6	413d	406d	410
El-Dorado	18.1a	16.3a	17.2	24.6a	25.4a	24.7	392d	407d	399

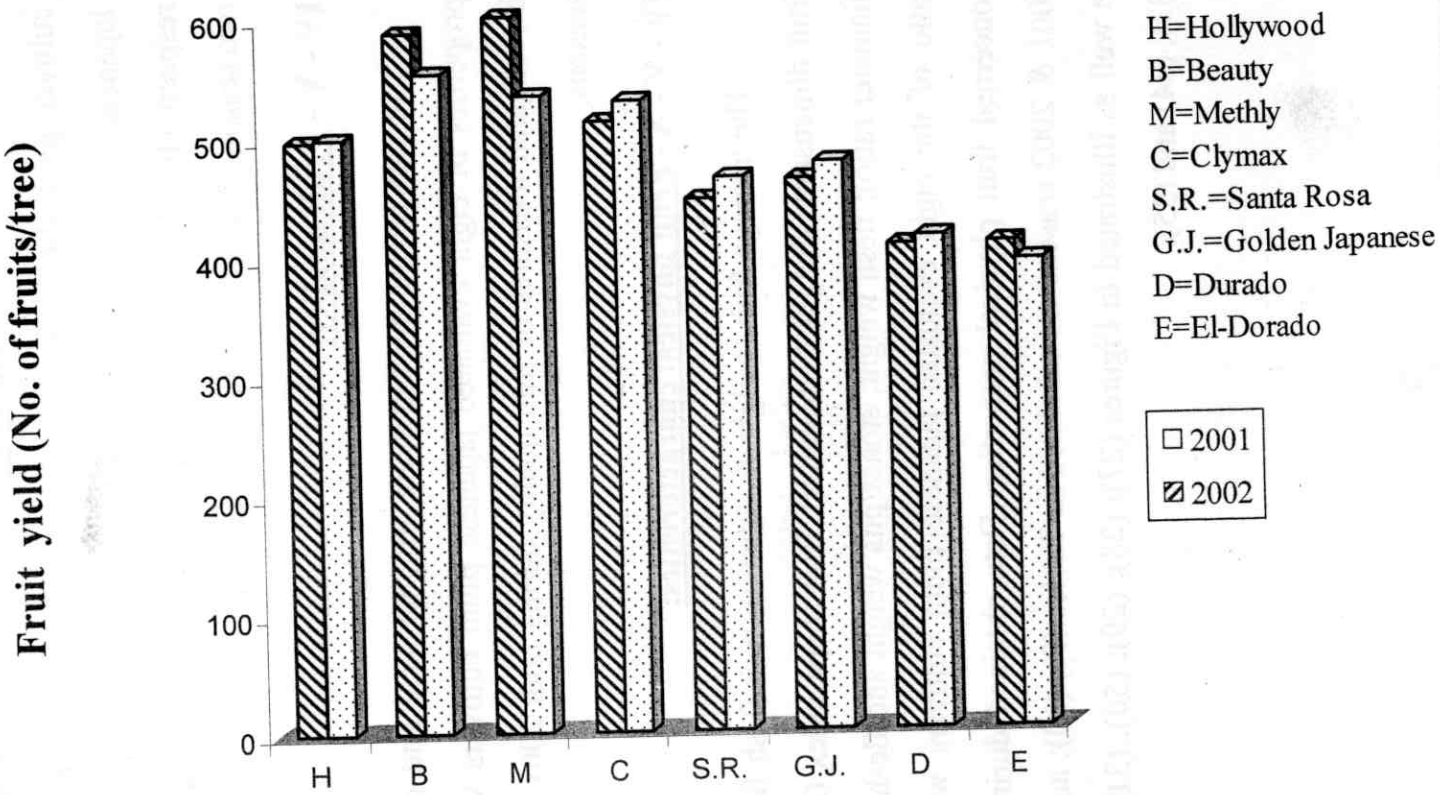


Figure (26): Yield expressed as number of fruits per tree for eight evaluated plum cultivars during 2001 and 2002 seasons

While, yield of Howard Miracle and Kelsey cultivars came in between. Moreover, **Saeid et al. (1993),** indicated that Methly cultivar gave the highest yield per tree followed by Golden Japanese, Clymax, Santa Rosa and Hollywood cultivars, respectively. Moreover, they mentioned also that the yield of the two seasons followed nearly the same trend.

IV - V - Fruit quality:

In this regard the following fruit physical and chemical properties of eight evaluated japanese plum cultivars were the investigated measures of fruit quality during both 2001 & 2002 seasons.

IV - V - A - Fruit physical characteristics:

The average fruit (weight & volume); fruit flesh firmness; fruit dimensions (height & diameter); fruit shape index (height : diameter ratio); flesh weight; stones/pits weight and flesh / stone ratio of the eight evaluated japanese plum cultivars were the concerned fruit physical properties. Data obtained during both 2001 & 2002 seasons are tabulated in Tables (9); (10); and (11), as well as illustrated in Figures (27); (28); (29); (30); (31); (32); (33); (34) and (35).

IV - V - A - 1 - Fruit weight (gm):

With respect to the fruit weight (gm), data tabulated in Table (9) and Fig. (27) revealed obviously that the average fruit weight (gm) in the eight studied plum cultivars during both 2001 and 2002 seasons had varied considerably.

The obtained results show a significant varietal difference in plum fruit weight. The heaviest fruit was that of El-Dorado cultivar (60.49 & 62.31 gm) followed by Durado cultivar (55.68 & 58.56 gm), Santa Rosa cultivar (52.67 & 50.79 gm), Golden Japanese cultivar (50.04 & 49.56 gm) and Hollywood cultivar (40.72 & 42.96 gm) in the first and second seasons, respectively. While the lightest fruit weight was significantly related to Methly cultivar (22.27 & 23.94 gm), followed by Beauty cultivar (27.10 & 30.33 gm) and Clymax (29.41 & 30.50 gm) during both 2001 and 2002 seasons, respectively. The differences between those cultivars were significant as a given cultivar was compared to the 7 other ones in the first season. However, in the second season the superiority of El-Dorado and the inferiority of Methly cultivar were still significant, while differences either between Santa Rosa and Golden Japanese or between Beauty and Clymax were so light to reach level of significance. It could be noticed that the average fruit weight for eight plum cultivars under study varied from year to another. Variation in average fruit weight of the same

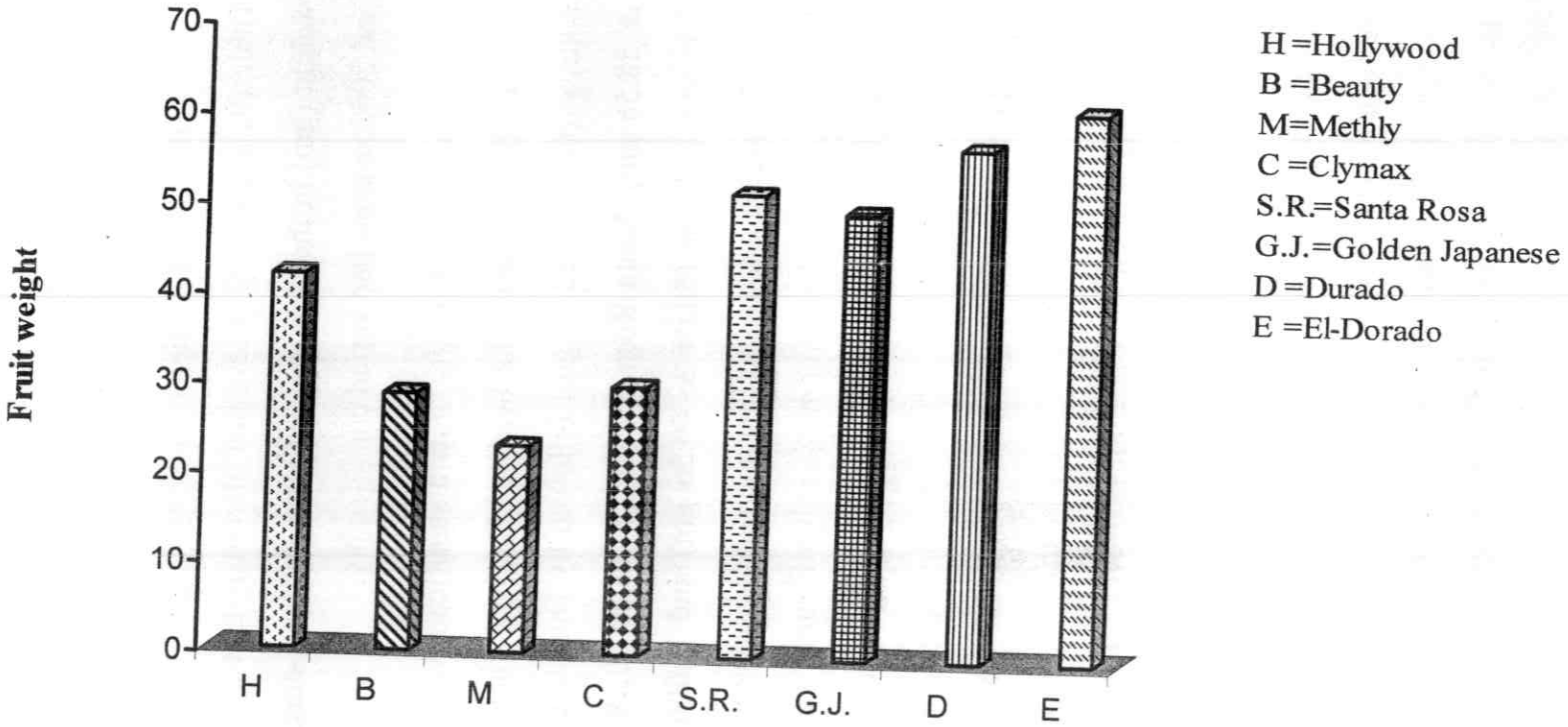


Figure (27): Fruit weight (an average of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

cultivar in some cases may be due to tree cropping (yield/tree) which reflected the various responsible factors such as climatic condition; agricultural practices; nutritional status and other related factors from one hand and negative relationship between fruiting load and average fruit size/weight from the other.

IV - V - A - 2 - Fruit volume (ml):

Referring the fruit volume, obtained results presented in Table (9) and Fig. (28) displayed clearly that the previously detected trend with fruit weight was also found for the fruit volume in eight plum cultivars under investigation during both 2001 and 2002 seasons. Hence, the highest value of fruit volume was statistically related to El-Dorado cultivar (57.77 & 59.00) followed in a descending order by Durado cultivar (52.93 & 56.03), Santa Rosa cultivar (51.33 & 49.00) and Golden Japanese cultivar (47.60 & 48.41) in the first and second seasons of study, respectively.

On the contrary, the lowest value of fruit volume was gained by Methly cultivar (21.27 & 23.13) Beauty cultivar (25.79 & 29.00) and Clymax cultivar (28.27 & 28.77).

In addition, Hollywood plum fruit has an intermediate volume (38.68 & 40.51) as compared to the abovementioned two extents during both 2001 and 2002 seasons, respectively.

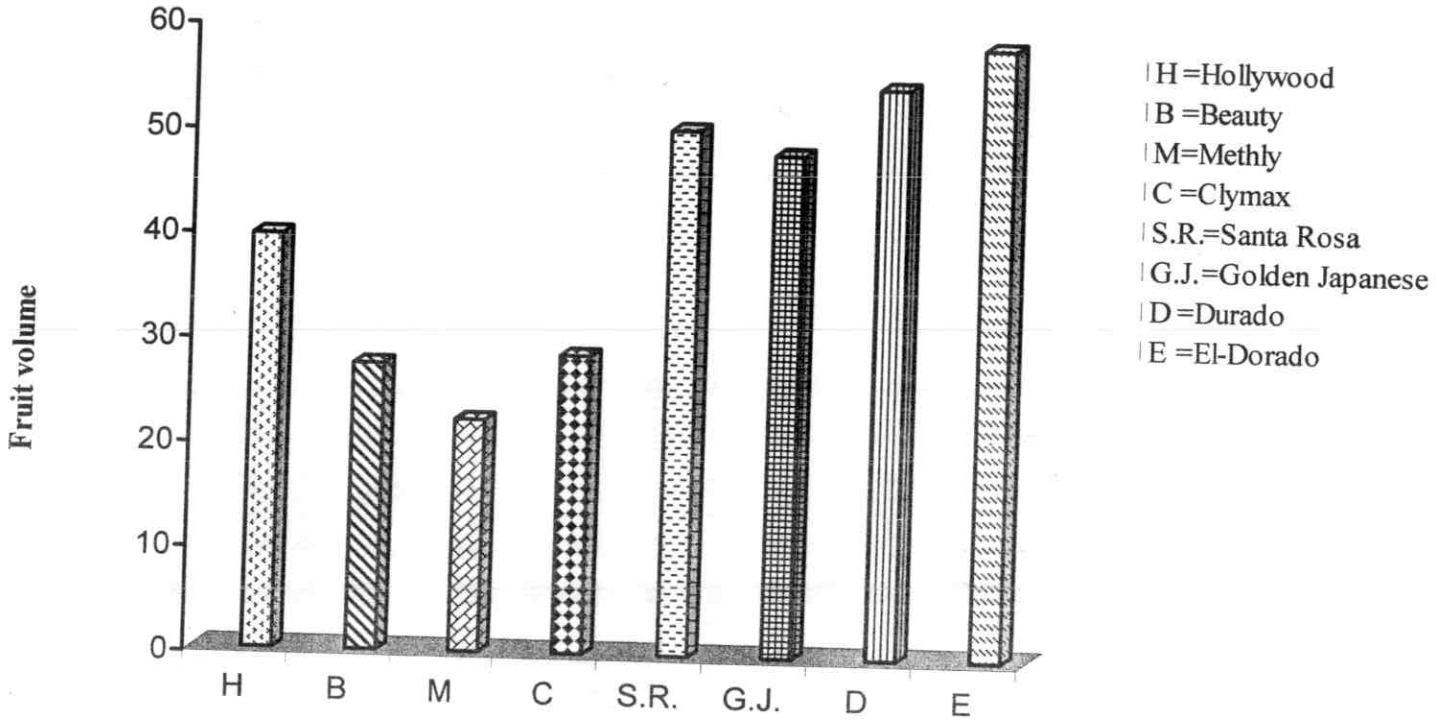


Figure (28): Fruit volume (an average of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

Table (9): Average fruit weight, volume and firmness of eight japanese plum cultivars evaluated during 2001 and 2002 seasons

Cultivars	Fruit weight (gm)			Fruit volume (ml)			Fruit firmness (lb/inch^2)		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	40.72e	42.96d	41.84	38.68e	40.51d	39.60	11.23cd	11.17f	11.20
Beauty	27.10g	30.33e	28.72	25.79g	29.00e	27.40	10.77d	11.60e	11.19
Methly	22.27h	23.94f	23.11	21.27h	23.13f	22.20	11.67c	12.07d	11.87
Clymax	29.41f	30.50e	29.96	28.27f	28.77e	28.52	11.53c	12.40c	11.97
Santa Rosa	52.67c	50.79c	51.73	51.33c	49.00c	50.17	16.73a	16.00b	16.37
G. Japanese	50.04d	49.56c	49.80	47.60d	48.41c	48.01	11.87c	12.00d	11.94
Durado	55.68b	58.56b	57.12	52.93b	56.03b	54.48	15.80b	15.73b	15.76
El-Dorado	60.49a	62.31a	61.40	57.77a	59.00a	58.39	16.50ab	17.10a	16.80

On the other hand, the differences between the evaluated eight plum cultivars under study were significant in both seasons of study except between Beauty and Clymax cultivars from one hand and between Santa Rosa and Golden Japanese cultivars from the other where the differences were not significant in the second season only.

IV - V - A - 3 - Fruit height:

With regard to fruit height of the eight investigated plum cultivars, it is clear from the obtained results during both 2001 and 2002 seasons as shown from Table (10) and Fig. (29) that fruits of both El-Dorado and Santa Rosa had significantly the greatest height, followed in a descending order by Durado; Golden Japanese and/or Hollywood plum cultivars.

Contrary to that both Methly and Clymax cultivars were significantly the inferior as fruit height was concerned. Such trend was true in the first season. Meanwhile, in the second season, El-Dorado was the superior as its fruits had significantly the highest value of fruit height descendingly followed by both Santa Rosa and Durado cultivars, while the three Methly, Clymax and Beauty cultivars were the inferior from the statistic point of view. Moreover, both Hollywood and Golden Japanese cultivars having statistically an intermediate fruit height as compared to the aforesaid two extremes in second season.

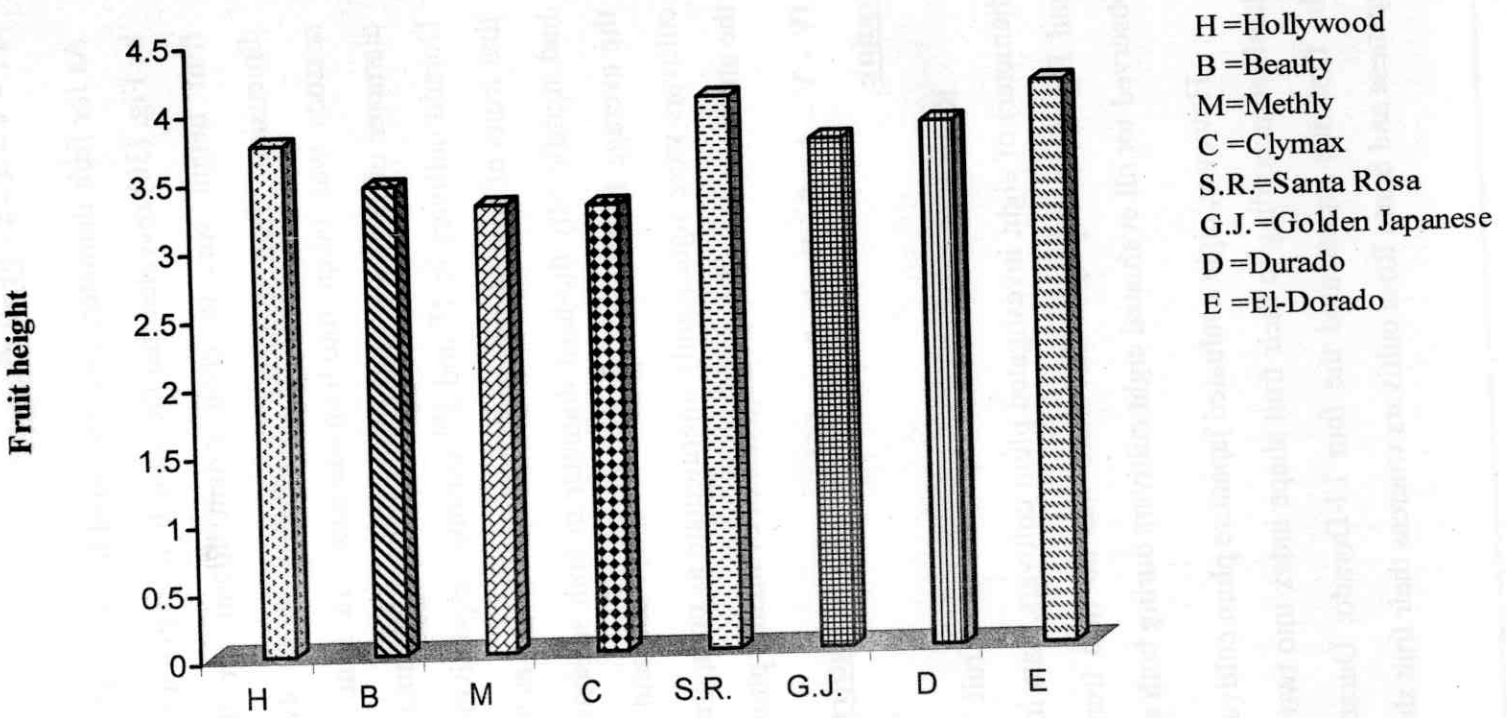


Figure (29): Fruit height (an average of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

IV - V - A - 4 - Fruit diameter:

As for fruit diameter, data presented in Table (10) and illustrated by Fig. (30) revealed that the same trend previously detected with fruit height was to great extent found for the other fruit dimension "fruit diameter" especially as an average of two seasons was taken into consideration. In spite of the widest diameter of fruit was statistically related to Santa Rosa and El-Dorado cultivars in 1st and 2nd seasons, respectively. Contrary to that fruits of both Methly and Clymax cultivars as well as Beauty had significantly the least diameter in both seasons. Meanwhile, the average fruit diameter of both Hollywood and Beauty plum cultivars were significantly intermediate as compared to those of the abovementioned two categories of evaluated plum cultivars.

IV - V - A - 5 - Fruit shape index (fruit height/fruit diameter ratio):

Regarding the fruit shape index (fruit height/fruit diameter) of eight investigated plum cultivars, data in Table (10) and Fig. (31) displayed that there was no firm trend could be observed for all evaluated eight cultivars during both seasons.

However, eight evaluated japanese plum cultivars could be classified according to their fruit shape index into two categories. The first one represented the four El-Dorado; Durado; Golden Japanese and Santa Rosa cultivars whereas their fruit shape tended

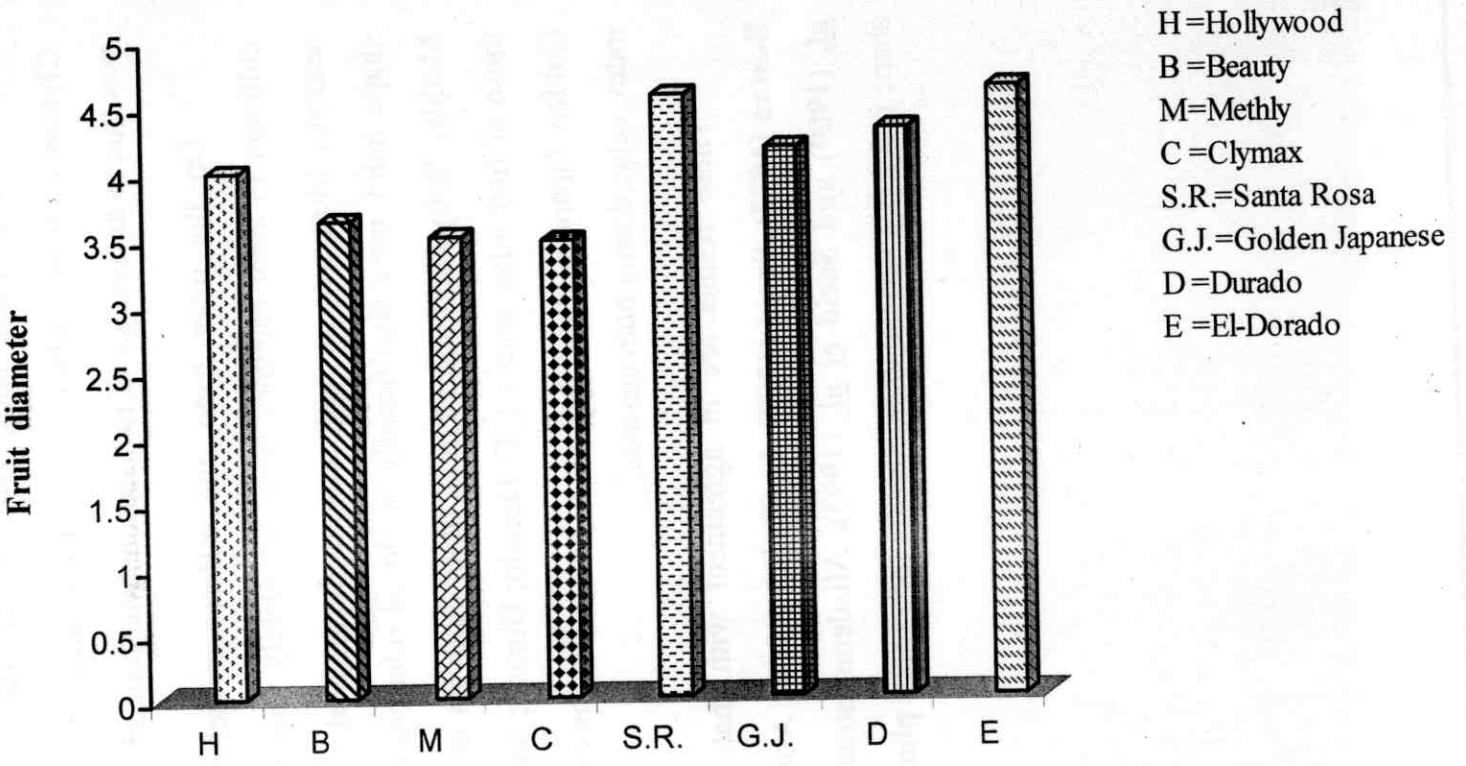


Figure (30): Fruit diameter (an average of seasons 2001 & 2002) for eight investigated japanese plum cultivars

to be more flattened as compared to those of the second group i.e., the four other ones, (Hollywood; Beauty; Methly and Clymax cultivars) which had nearly rounded fruits. Such trend was true as an average of two seasons was concerned.

On the other hand, the differences between the four cultivars of each category were completely absent during both seasons. Moreover, in both seasons the highest values of fruit shape index were significantly in closed relationship to Beauty, Methly, Hollywood and Clymax plum cultivars as compared to those of four other ones i.e. El-Dorado; Durado; Santa Rosa and Golden Japanese which had significantly the lowest fruit shape index value during both seasons.

These results are in agreement with that reported by **Bostan (1977), Saeid (1982), El-Sheikh (1986), Abd El-Aziz et al. (1989) and Saeid et al. (1993).** All demonstrated that fruit shape index is a varietal characteristic for various plum cultivars.

Table (10): Fruit dimensions (fruit height and diameter) and shape index of eight japanese plum cultivars evaluated during 2001 and 2002 seasons

Cultivars	Fruit height (cm)			Fruit diameter (cm)			Fruit shape index		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	3.74b	3.74c	3.74	3.91d	4.07c	3.99	0.967a	0.940a	0.954
Beauty	3.43c	3.43d	3.43	3.61e	3.63d	3.62	0.953ab	0.947a	0.950
Methly	3.23d	3.33d	3.28	3.47f	3.53d	3.50	0.933c	0.943a	0.938
Clymax	3.23d	3.30d	3.27	3.40f	3.53d	3.47	0.943bc	0.930a	0.937
Santa Rosa	4.17a	3.90b	4.04	4.67a	4.44b	4.56	0.900d	0.897bc	0.899
G. Japanese	3.75b	3.69c	3.72	4.17c	4.14c	4.16	0.900d	0.890bc	0.895
Durado	3.69b	3.96b	3.83	4.22c	4.37b	4.30	0.883d	0.907b	0.895
El-Dorado	4.07a	4.15a	4.11	4.53b	4.68a	4.61	0.890d	0.887c	0.889

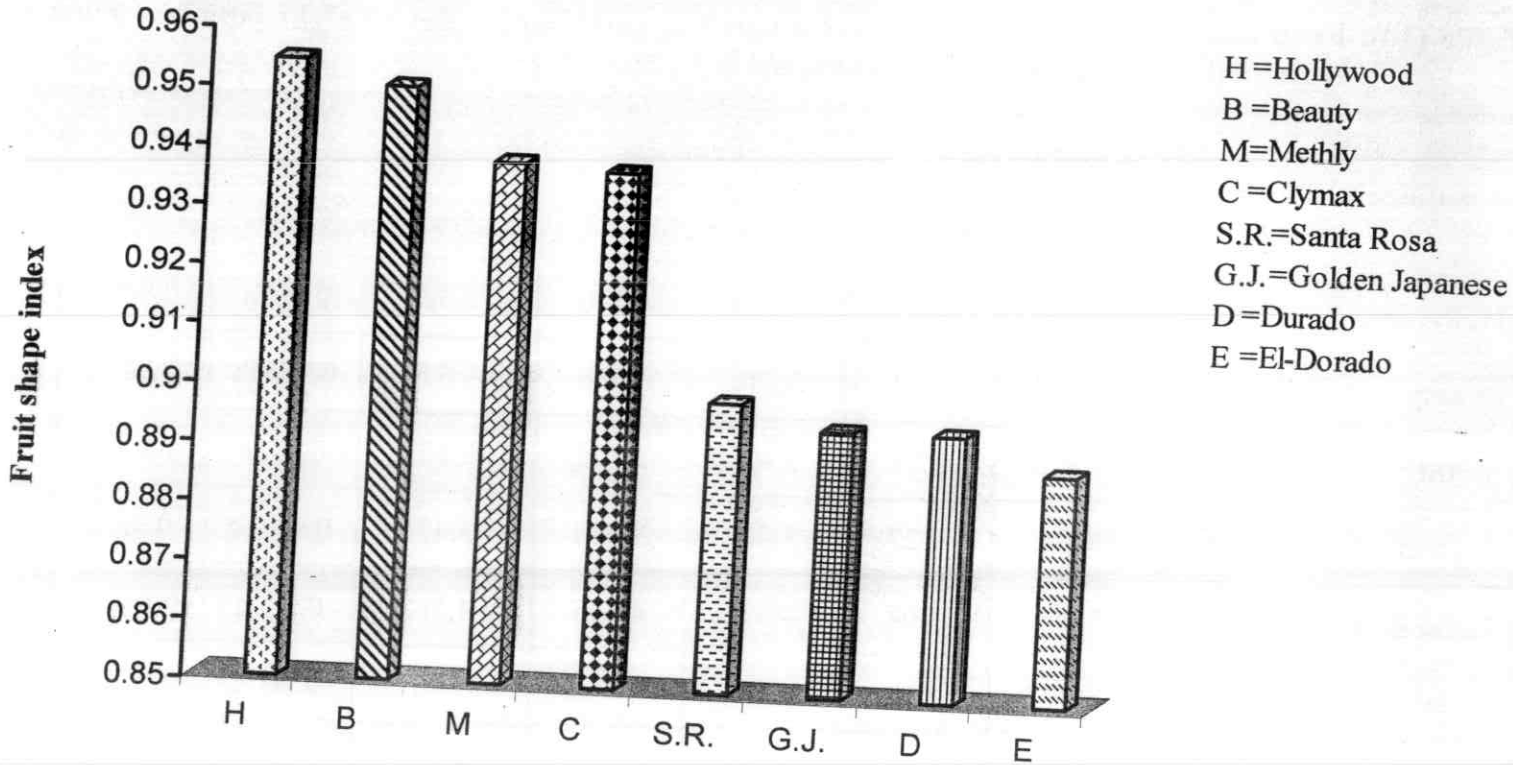


Figure (31): Fruit shape index (an average of 2001 and 2002 seasons) for eight investigated japanese plum cultivars

IV - V - A - 6 - Fruit firmness:

Concerning the fruit flesh firmness as related to plum cultivars under study, it is clear from obtained results in Table (9) and Fig. (32) that a significant differences were observed between most investigated plum cultivars. Hence, Santa Rosa cultivar induced fruits having firmer flesh texture than those of other studied cultivars followed by both El-Dorado and Durado cultivars. However, Beauty cultivar had the lowest fruit firmness as compared to the other cultivars. Meanwhile, Golden Japanese, Methly, Clymax and Hollywood plum cultivars were in between the aforesaid two extremes and having approximately the same fruit firmness, especially in the 1st season.

Moreover, in the second season, data indicated that El-Dorado cultivar induced fruits had significantly the firmest flesh texture followed by both Santa Rosa and Durado cultivars. Contrary to that, both Hollywood and Beauty cultivars showed significantly the least value of flesh firmness as data of each season or an average of two seasons were concerned. Meanwhile, the other cultivars i.e. Clymax, Golden Japanese and Methly were in between with no significant differences between them.

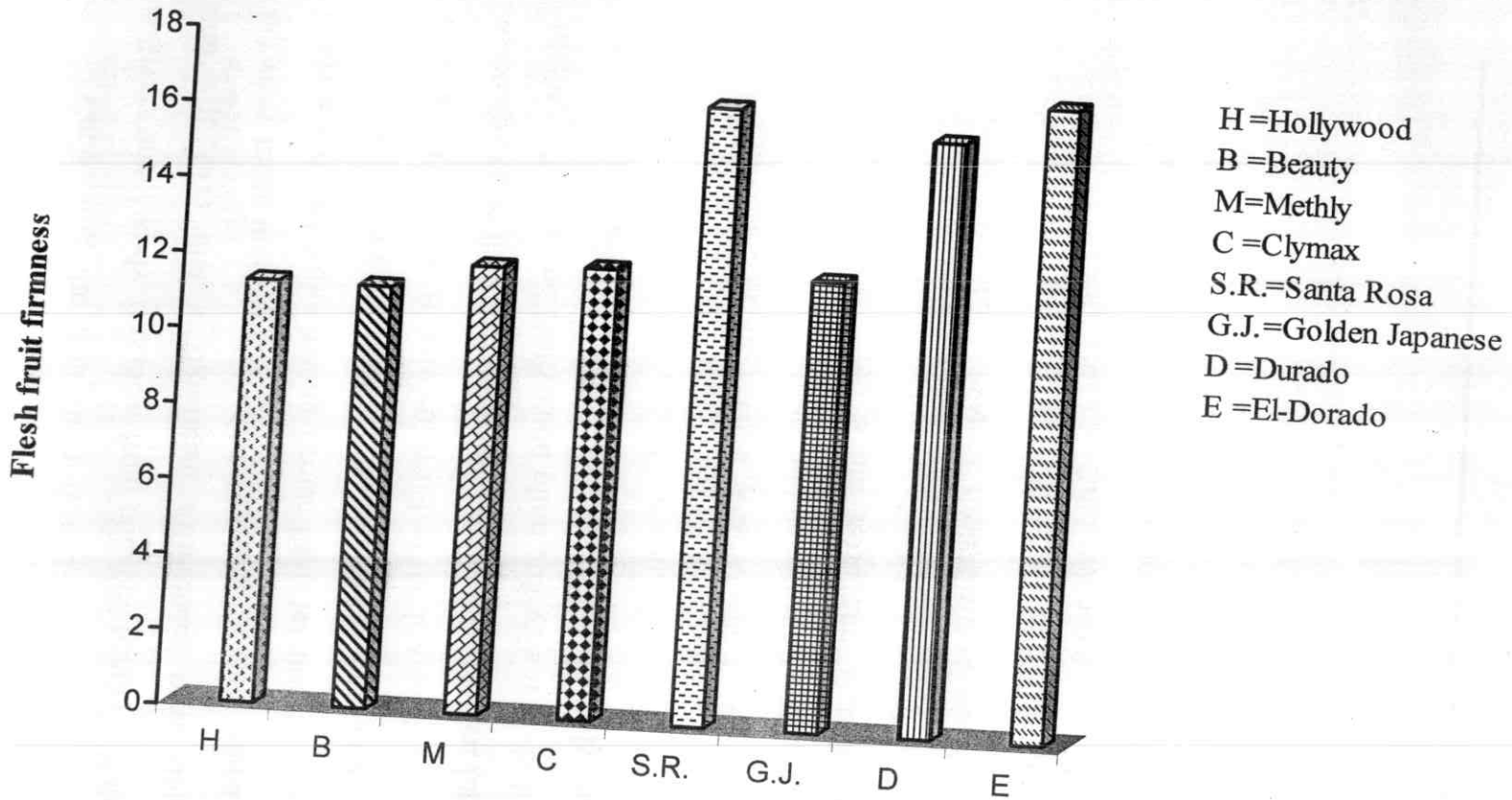


Figure (32): Fruit flesh firmness (an average of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

IV - V - A - 7 – Fruit flesh weight:

With regard to the fruit flesh weight (gm) in relation to evaluated cultivars, data presented in Table (11) and illustrated by Fig. (33) displayed obviously a considerable variation between all investigated plum cultivars during both seasons of study.

Neverthless, the differences followed generally the same trend previously detected with fruit weight especially in the first season whereas both parameters for the eight plum cultivars under study were coincident.

Moreover, differences were significant in both seasons of study except with comparison between Beauty and Clymax cultivars in the second season whereas both cultivars had the same values.

In addition it could be observed clearly that the heaviest flesh weight was significantly coupled with fruit of El-Dorado cultivar (57.98 and 59.59 gm) followed in a descending order by Durado cultivar (53.69 & 56.10 gm) Santa Rosa cultivar (51.08 & 48.84 gm), Golden Japanese (48.12 & 47.51 gm) during both 2001 and 2002 seasons, respectively. However, the lightest flesh weight was related to Methly cultivar (20.87 & 22.49), Beauty cultivar (26.10 & 28.58) and Clymax cultivar (27.76 & 28.80 gm) in the first and second seasons respectively. While Hollywood plum cultivar came in between the abovementioned two categories of plum cultivars (38.64 & 40.56 gm) in both seasons of study.

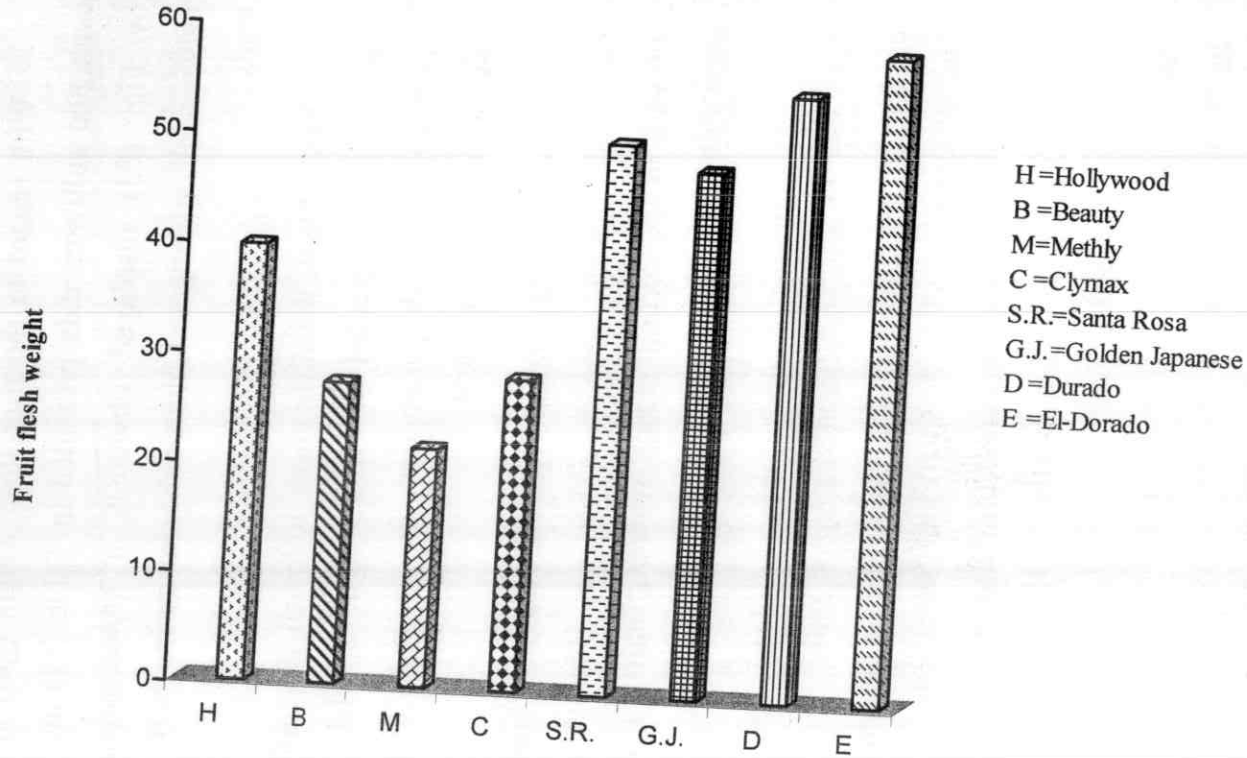


Figure (33): Fruit flesh weight (an average value of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

IV - V - A - 7 – Fruit flesh weight:

With regard to the fruit flesh weight (gm) in relation to evaluated cultivars, data presented in Table (11) and illustrated by Fig. (33) displayed obviously a considerable variation between all investigated plum cultivars during both seasons of study.

Neverthless, the differences followed generally the same trend previously detected with fruit weight especially in the first season whereas both parameters for the eight plum cultivars under study were coincident.

Moreover, differences were significant in both seasons of study except with comparison between Beauty and Clymax cultivars in the second season whereas both cultivars had the same values.

In addition it could be observed clearly that the heaviest flesh weight was significantly coupled with fruit of El-Dorado cultivar (57.98 and 59.59 gm) followed in a descending order by Durado cultivar (53.69 & 56.10 gm) Santa Rosa cultivar (51.08 & 48.84 gm), Golden Japanese (48.12 & 47.51 gm) during both 2001 and 2002 seasons, respectively. However, the lightest flesh weight was related to Methly cultivar (20.87 & 22.49), Beauty cultivar (26.10 & 28.58) and Clymax cultivar (27.76 & 28.80 gm) in the first and second seasons respectively. While Hollywood plum cultivar came in between the abovementioned two categories of plum cultivars (38.64 & 40.56 gm) in both seasons of study.

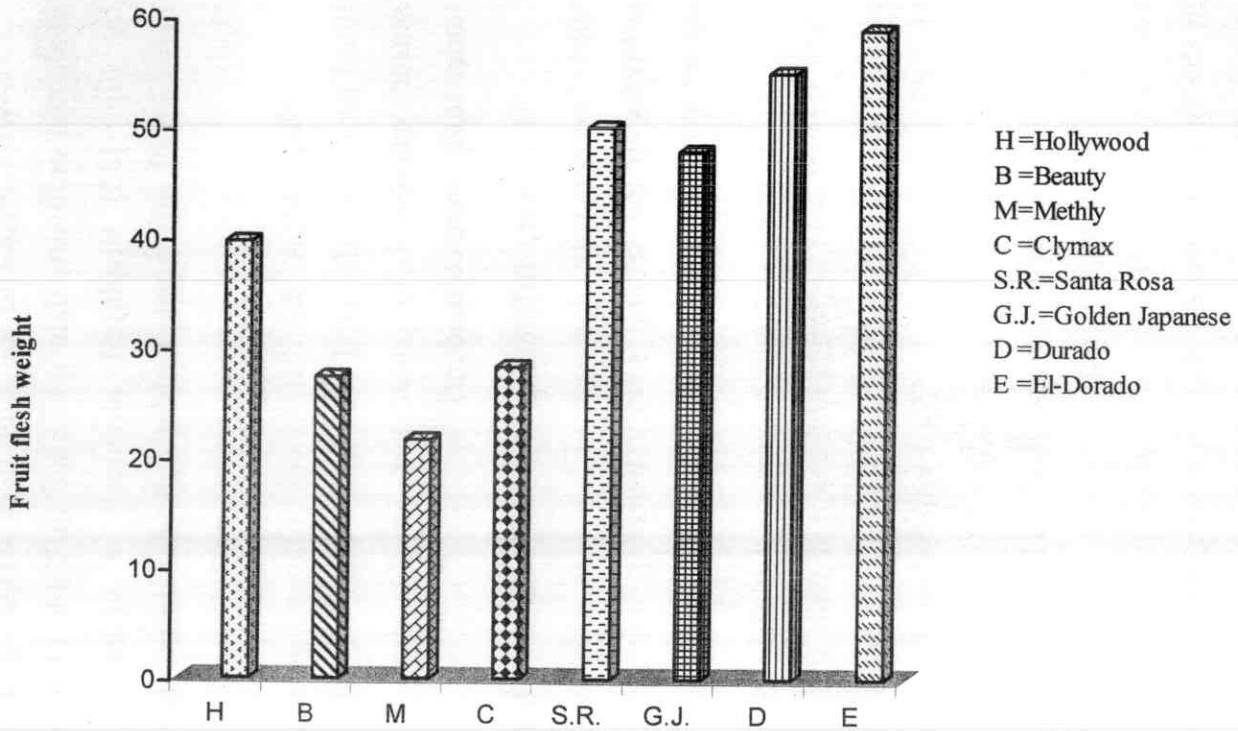


Figure (33): Fruit flesh weight (an average value of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

IV - V - A - 8 – Stone (seed) weight:

Regarding seed (stone/pit) weight, the obtained results presented in Table (11) and Fig. (34) revealed obviously that there were significant differences between most investigated plum cultivars. Anyhow seed of El-Dorado fruit had significantly the heaviest weight i.e., 2.51 and 2.71gm during both 2001 & 2002 seasons, respectively.

Moreover, both Hollywood and Durado cultivars ranked statistically second after El-Dorado, whereas avearge pit weight for Hollywood and Durado cultivars reached during both seasons (2.05 & 2.39) and (2.00 & 2.45) gm for former and later cultivars respectively.

Contrary to that Methly cultivar had statistically the lightest stone weight during both seasons (1.41 & 1.49g.) followed in an increasing order by both Clymax (1.65 & 1.65) and Beauty (1.66 & 1.75). Meanwhile, two other evaluated plum cultivars (Santa Rosa & Golden Japanese) came in between the aforesaid two extremes.

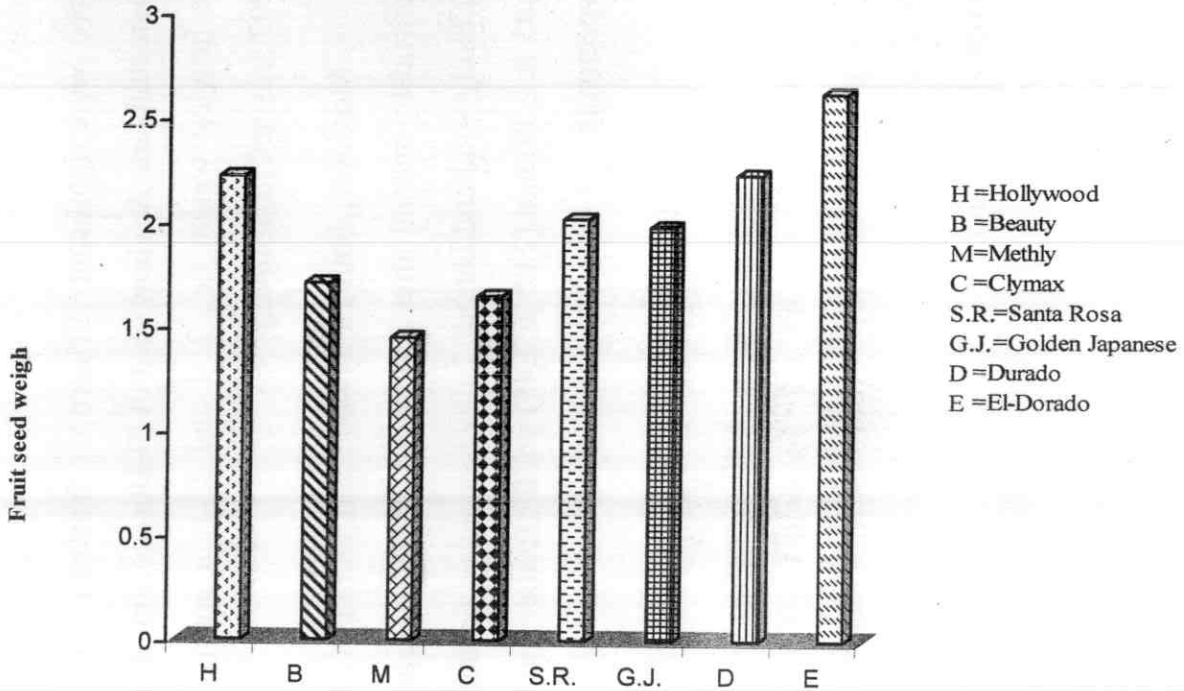


Figure (34): Fruit stone (pit) weight (an average value of 2001 & 2002 seasons) for eight evaluated japanese plum cultivars

IV - V - A - 9 - Flesh/stone ratio:

Concerning the flesh/pit ratio of fruits for eight evaluated japanese plum cultivars, Table (11) and Fig. (35) show that such fruit physical characteristic was widely varied from one cultivar to another. It is so quite clear that Durado cultivar exhibited statistically the highest flesh/pit ratio in its fruits (27.07 & 24.05) during 1st and 2nd seasons, respectively. The superiority of Durado cultivar was true either data of each season or an averageof 2 seasons were taken into consideration. However, Santa Rosa; Golden Japanese and El-Durado cultivars ranked second after Durado cultivar in 1st sesason but all four cultivars were equally the same regarding the flesh/seed ratio from the statistical standpoint.

On the other hand, four other evaluated cultivars i.e. Methly; Beauty; Clymax and Hollywood had significantlly lower flesh/seed ratio as compared to the abovementioned four cultivars. However, Methly showed the least flesh/seed ratio but differences didn't reach level of significance as compared to such former group, especially in 2002 season.

Such trend was true during both seasons either data of each individual season or an average of both seasons were concerned.

Table (11): Average flesh weight, pit weight and flesh/pit ratio of eight japanese plum cultivars evaluated during both 2001 and 2002 seasons

Cultivars	Flesh weight (gm)			Pit weight (gm)			Flesh/Pit ratio		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
Hollywood	38.6e	40.5e	39.60	2.05b	2.39b	2.22	19.19c	18.22b	18.71
Beauty	26.10g	28.58f	27.34	1.66d	1.75d	1.71	16.85d	16.73b	16.79
Methly	20.87h	22.49g	21.68	1.41e	1.49e	1.45	16.01d	15.87b	15.94
Clymax	27.76f	28.80f	28.28	1.65d	1.65de	1.65	16.87d	17.68b	17.28
Santa Rosa	51.08c	48.84c	49.96	2.09b	1.95c	2.02	24.50b	25.12a	24.81
G. Japanese	48.12d	47.51d	47.82	1.92c	2.04c	1.98	24.30b	23.95a	24.13
Durado	53.69b	56.10b	54.90	2.00bc	2.45b	2.23	27.07a	24.05a	25.79
El-Dorado	57.98a	59.59a	58.79	2.51a	2.72a	2.62	23.19b	22.04a	22.62

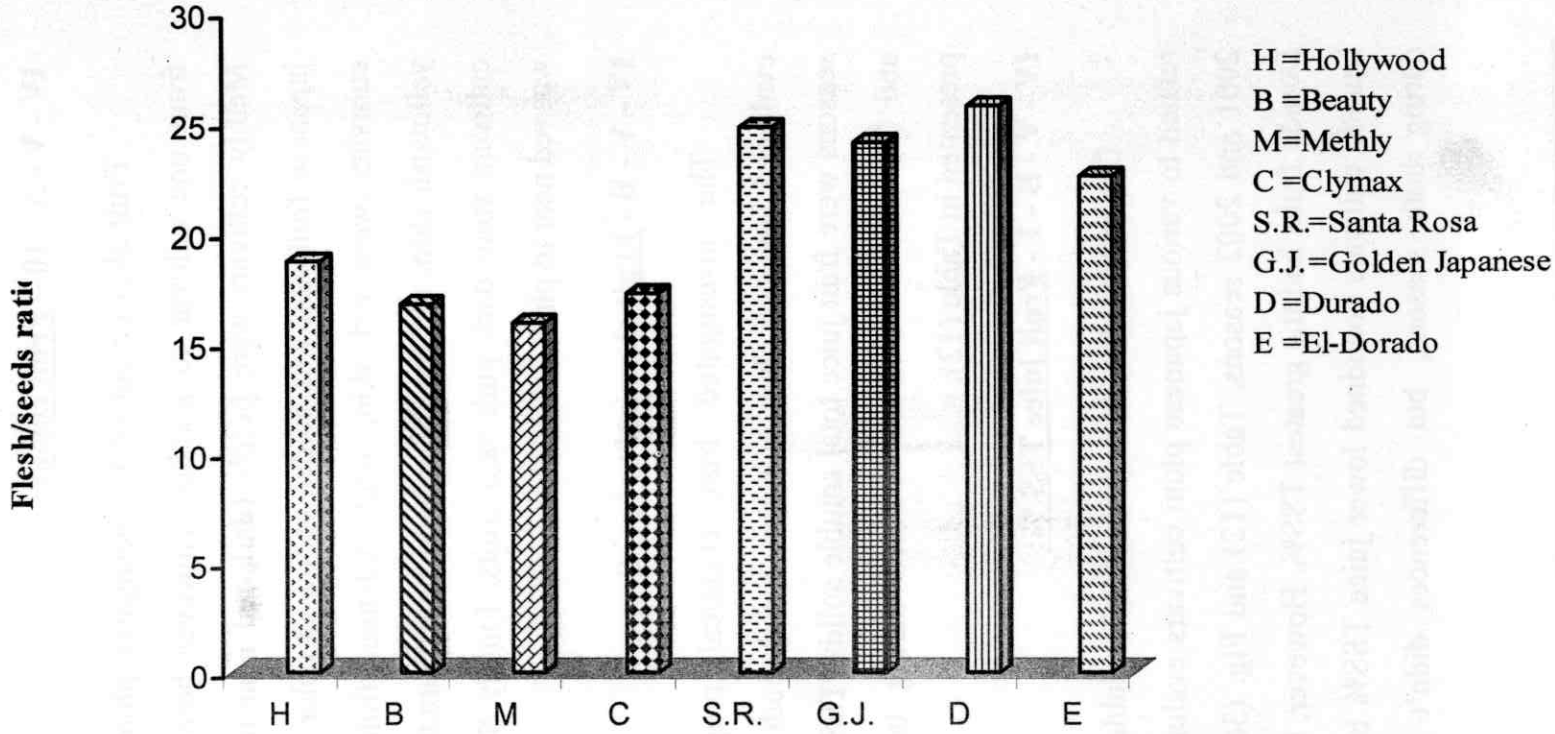


Figure (35): Flesh/seed ratio (an average value of 2001 & 2002 seasons) for eight investigated japanese plum cultivars

IV - V - A - 10 – Fruit colour:

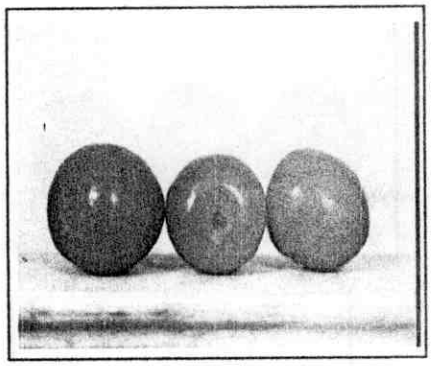
Fruit skin colour of 8 investigated plum cultivars varied from one cultivar to another. However both Hollywood and Methly cultivars were purple (dark red near to violet), Golden japanese fruit skin was golden yellow in color. Fruits of Beauty cultivars were red skin, while Clymax fruit skin was red-yellowish skin. On the other hand both Durado and El-Dorado cultivars were dark pink skin fruits. Finally Santa Rosa Fruits was red near to pink.

IV - V - B - Fruit chemical properties:

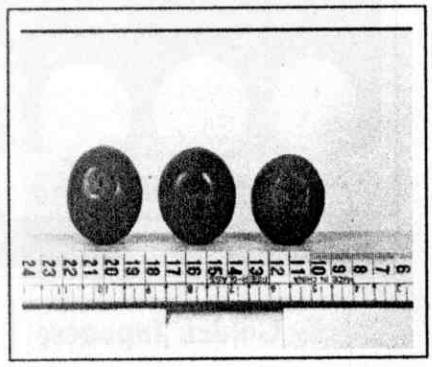
The investigated fruit chemical properties for the evaluated japanese plum cultivars during both 2001 and 2002 seasons were fruit juice total soluble solids (TSS%); total acidity and TSS/acid ratio. Data obtained during both seasons are presented in Table (12).

IV - V - B - 1 - Fruit juice TSS %:

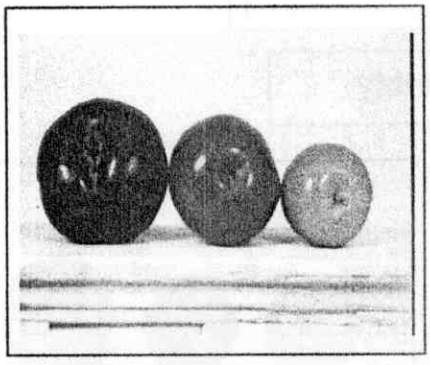
Concerning the fruit juice total soluble percentage as related to various japanese plum cultivars evaluated during both 2001 and 2002 seasons, Table (12) and Fig. (36) show that El-Dorado fruits had the greatest TSS%. However, both Beauty and Durado cultivars contained lower juice TSS% below El-Dorado during both seasons, but differences didn't reach level of



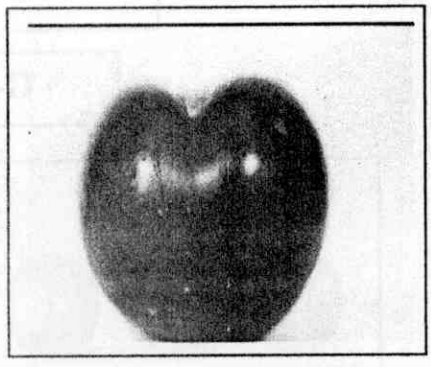
A- Beauty



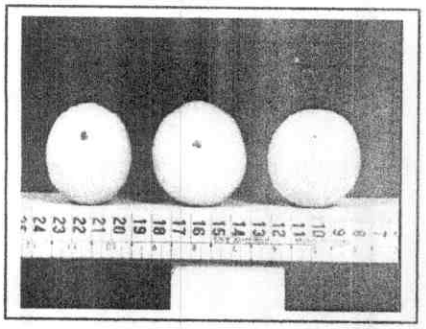
B- Clymax



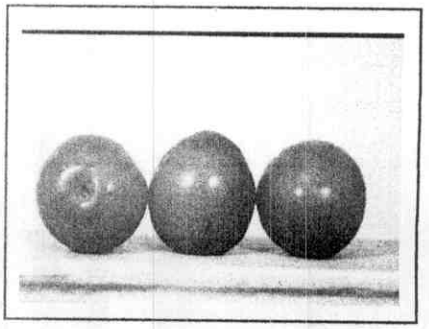
C- Durado-
Hollywood-Beauty



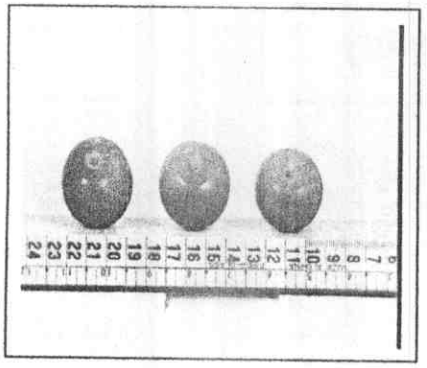
D- Durado



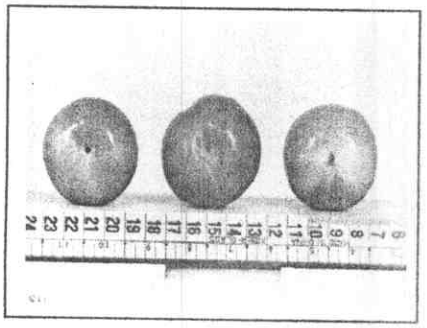
E- Golden Japanese



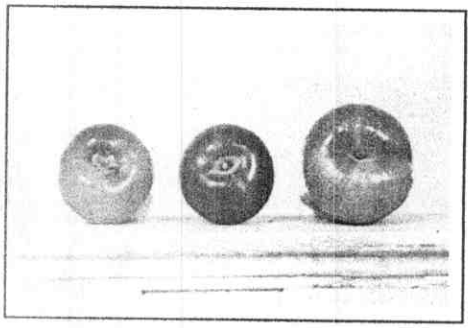
F- Hollywood



G- Methly



H-Santa Rosa



H- Durado - Hollywood - El-Dorado

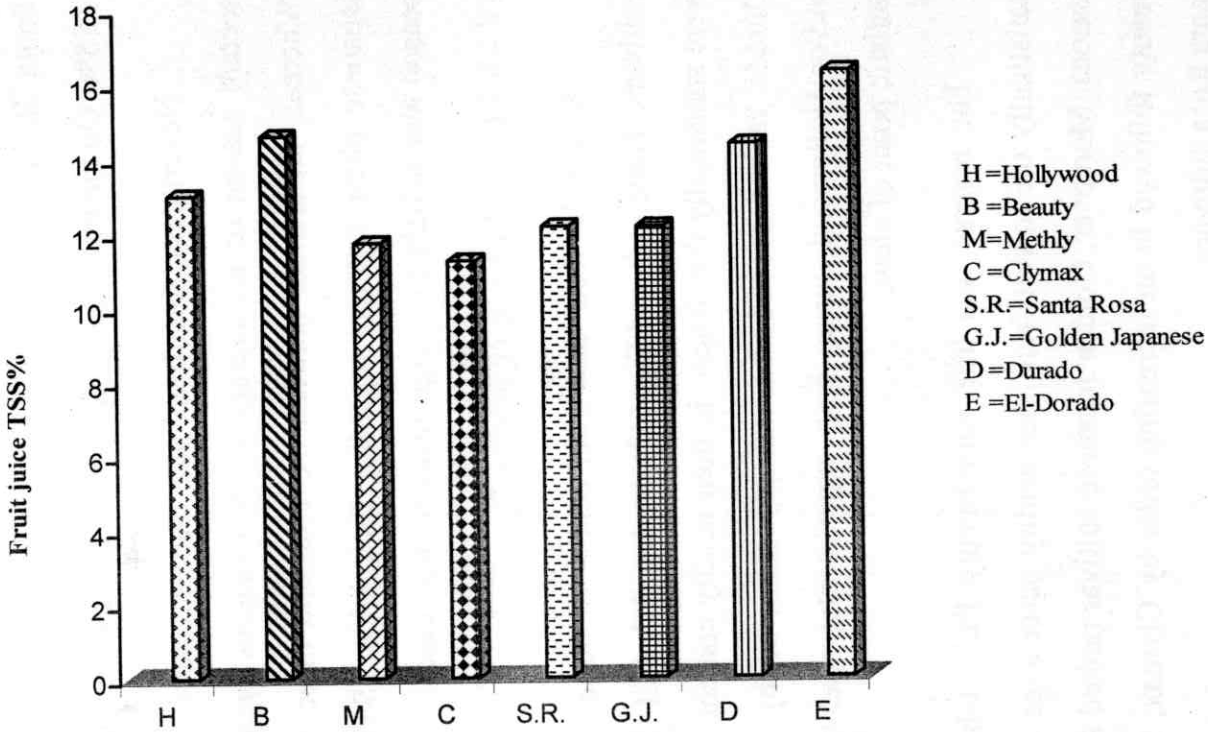


Figure (36): Fruit juice TSS% (an average value of 2001 & 2002 seasons) for eight evaluated japanese plum cultivars

significance. Contrary to that Clymax; Methly and to great extent Santa Rosa & Golden Japanese showed the least fruit juice TSS%. On the other hand, Hollywood fruits were intermediate.

Neverthless, such trend was true especially as data of the second season or an average of two seasons were concerned. Whereas, differences between the aforesaid three categories of japanese plum cultivars regarding their juice TSS% during 1st season was so light to be significant in most cases.

IV - V - B - 2 - Fruit juice acidity %:

As for the fruit juice total acidity of the evaluated plum cultivars, Table (12) and Fig. (37) displayed that El-Dorado fruits were statistically the richest in their acidity content. Meanwhile, Durado ranked second descendingly followed by Santa Rosa and/or Hollywood during both experimental seasons from the statistic point of view.

The reverse was true with Beauty fruits which showed statistically the lowest fruit juice acidity percentage during both seasons. Moreover, Golden Japanese cultivar ranked second after Beauty followed in an increasing order by Clymax; Methly and Santa Rosa cultivars.

Such trend was to great extent clearly detected either data of each season or an average of two seasons were concerned.

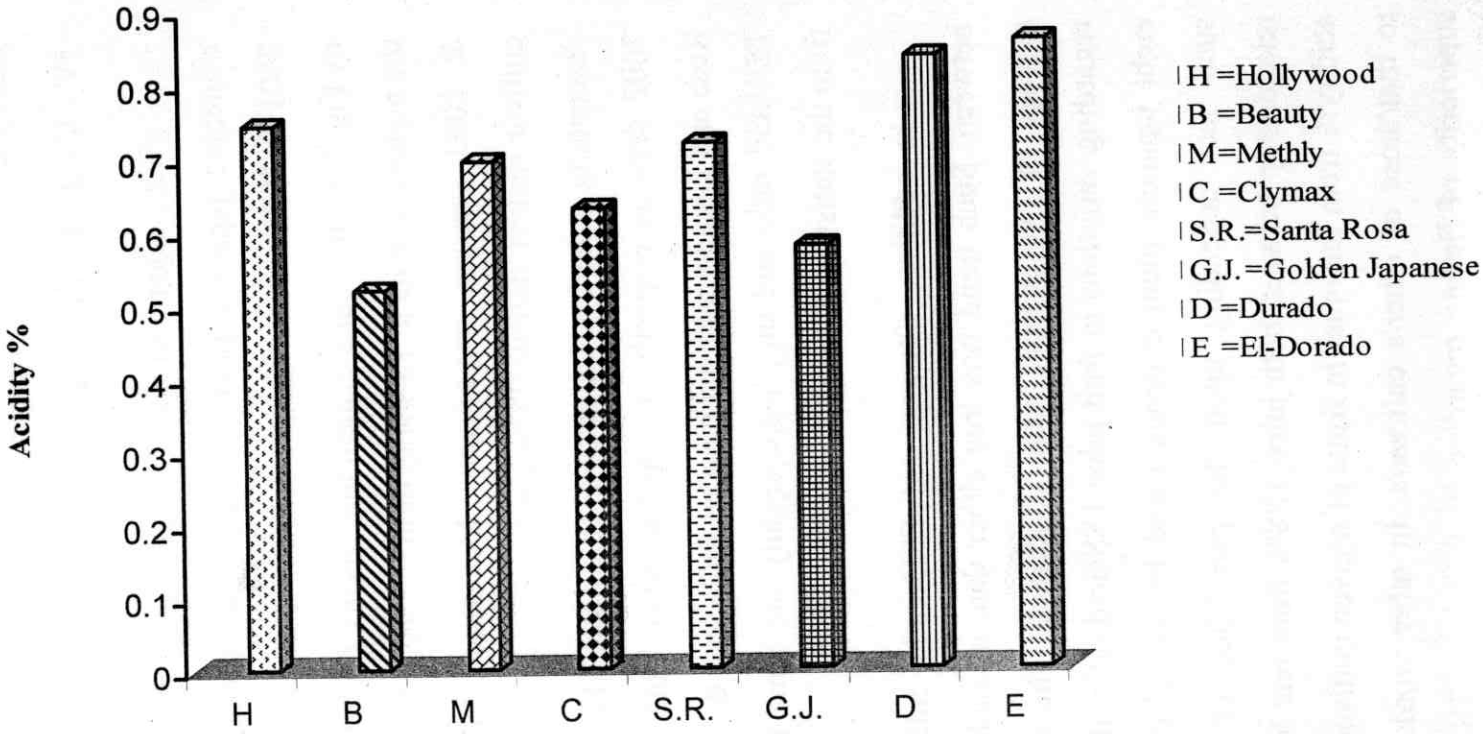


Figure (37): Fruit juice total acidity (an average value of 2001 & 2002 seasons) for eight evaluated japanese plum cultivars

IV - V - B - 3 – Fruit juice TSS / acid ratio:

With regard to the TSS/acid ratio in fruit juice of the evaluated japanese plum cultivars, data obtained during both 2001 & 2002 seasons are presented in Table (12) and illustrated by Fig. (38). It is quite evident that Beauty fruits had significanlty the highest fruit jucie TSS/acid ratio (27.94 & 27.84) during 2001 & 2002 seasons, respectively. Meanwhile, Golden Japanese cultivar ranked statistically second (21.18 & 20.27) followed in descending order by Hollywood (18.01 & 19.17) during 2001 & 2002 seasons respectively. On the other hand, Methly; Santa Rosa and Durado cultivars induced fruits with the least fruit jucie TSS/acid ratio and they were equally the same in this concern from the statistical point of view.

In addition, Clymax and El-Dorado cultivars were in between. Such trend was true either data of each season or an average of two seasons were concerned. The detected trend regarding variations in fruit juice TSS/acid ratio of the evaluated eight japanese plum cultivars could be logically explained on such fact depending upon the parallelled or unparallelled relationship between both juice TSS% from one hand and juice acidity% from the other in fruits of a given cultivar as compared to that/those of other/s cultivar/s. In other words, the relative superiority of Beauty regarding its fruit juice TSS% from one

hand which associated with its inferiority pertaining acidity% is the real reason for its higher fruit juice TSS/acid ratio. However, the superiority of El-Dorado concerning its fruit juice TSS% which coupled with the most pronounced higher total acidity is the major reasonable factor for its lower TSS/acid ratio. Besides, the relative higher fruit juice TSS/acid ratio in Golden Japanese fruit was associated with the moderate lower TSS% and the more pronounced reduction in juice total acidity percentage. Such trend could be easily explained on the severe decrease in acidity% rather than TSS%.