

# The Patterns of Pomological Variation of Wild Plum (*Prunus divaricata* Ledeb.) in Kazdagi (Mt. Ida) Area of Turkey

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**Abstract**— Consisting of more than 9000 plant species, 30 % of them being endemics, the flora of Turkey is very rich in diversity. A wide range of different geological and climatic conditions and the location of the country has greatly contributed to the richness of this biodiversity. Turkey is located within the borders of several floristics regions namely: Euro-Siberian, Mediterranean, and Irano-Turanian. A broad spectrum of germplasm is required in breeding programs for crop improvement. This genetic variation in plant populations may be considerable especially in centers of diversity, or gene centers, of particular plants. Eight centers of variation, previously termed "centers of origin" were originally proposed by Vavilov. Two of these ("Near East" and "the Mediterranean") extend within borders of Turkey where five areas were designed as "gene microcenters" by Harlan. In order to identify Gene Management Zones of plum (*Prunus divaricata* Ledeb.) for *in-situ* conservation in Kazdagi, four plum sites were chosen as possible candidates zones.

Pomological characteristics of plum fruits collected from labelled trees were observed. Average fruit weight, fruit size, fruit colour, fruit taste, aroma, soluble solids, ratio of stone were recorded. The most fruit samples examined were found as rough-fibred or fleshy, little juicy, sour and much aromatic. Nevertheless, a few sample were found sweet to be eaten. The observation of pomological characteristics of plum populations is one of the ways to determine existing variability among them. From the findings of pomological characteristics it can be concluded that there were significant differences were observed in plum trees for fruit colours and fruit weight within and between sites.

**Keywords**— Plum, *Prunus divaricata*, pomological characteristics, *in-situ* conservation.

## I. INTRODUCTION

Consisting of more than 9000 plant species, 30 % of them being endemics, the flora of Turkey is very rich in diversity. A wide range of different geological and climatic conditions and

the location of the country has greatly contributed to the richness of this biodiversity. Turkey is located within the borders of several floristics regions namely: Euro-Siberian, Mediterranean, and Irano-Turanian [1].

A broad spectrum of germplasm is required in breeding programs for crop improvement. This genetic variation in plant populations may be considerable especially in centers of diversity, or gene centers, of particular plants [2]. Eight centers of variation, previously termed "centers of origin" were originally proposed by Vavilov [3]. Two of these ("Near East" and "the Mediterranean") extend within borders of Turkey where five areas were designed as "gene microcenters" by Harlan [4].

Sour and sweet cherry, plum, grape, apple, pear, mulberry, walnut, and filbert have parental or related species indigenous to Turkey. Several of these wild species of *Pyrus*, *Malus*, *Prunus* and *Vitis* are progenitors of present day cultivars. Some other species such as almond and apricot have been cultivated for many centuries. As valuable germplasm resources, they merit collection for two reasons, the broad genetic spectrum they represent and their wide diversity of tolerance to different ecological and climatic conditions [5].

For *ex-situ* conservation of fruit trees, genetic resources were kept in agricultural research institutes and stations, agricultural schools, state farms and agricultural faculties, totally 57 locations until 1985. An inventory of these collections was published [6] and later revised [7]. Unfortunately, most of the institutions had the tendency to keep the commercial varieties instead of fruit tree germplasm in their collections. After the evaluation programme, those institution have eliminated uneconomical but valuable genetic resources materials. So, most of them were lost in the course of time. Additionally, some modern cultivars were introduced and replaced with old cultivars. This situation caused extinction of many locally developed and climatically well adapted old cultivars.

12 cherry plum types were determined as different and having economic importance in result of pomological observation [8].

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*In-situ* conservation of plant genetic resources project, as a complementary study to *ex-situ* conservation was aimed to conserve those plant genetic resources in their natural habitats, and Kazdagi, Ceylanpinar State Farm and Anatolian Diagonal were selected as pilot study areas.

Plum (*Prunus divaricata* Ledeb.) specie were chosen as target species for Kazdagi area. The objective of this study was to determine the pomological variation patterns of this species in its habitats.

## II. MATERIAL AND METHODS

The material consisted of of the fruits of 160 plum trees selected from its populations at Kazdagi located in northwest of Turkey.

At the begining of the study 9 plum sites were chosen as preliminary candidate sites after initial surveys. Then, with the following surveys, four plum (Gadanalalan, Sarisu, Kilisealan, Yukarıçavuş) sites were determined as possible candidate zones. The total of 160 plum sample trees were pointed out at least 100 m. away from each other.

25 fruit samples were taken from each tree at the harvesting period. Pomological characteristics recorded were as follows: fruit weight (g), fruit shape, skin colour, flesh texture, seed weight (g), ratio of seed by weight (%), for plum.

## III. RESULTS AND DISCUSSION

The highest fruit weight was found at Yukarıçavuş as 16.0 g. while the smallest fruit weight was obtained from Sarisu with 2.2 g. (Table 1). Average fruit weight at all sites was around 7.0 g. The biggest variation was recorded at Gadanalalan site with a value of 131.31. The other three sites had similar variances in fruit weight.

TABLE I. FRUIT WEIGHT (G) OF PLUM ON THE BASIS OF SELECTION SITES

Site	Min.	Max.	Mean	Variation	St. error
Sarisu	2.2	9.8	6.9	72.38	1.95
Gadanalalan	3.6	14.4	6.8	131.31	2.24
Kilisealan	2.7	10.0	6.7	68.59	2.00
Yukarıçavuş	3.6	16.0	7.0	72.38	1.95

The range of seed weight at plum sites were between 0.32 (min.) and 1.80 g. (max.) (Table 2). The smallest seed weight sample was obtained from Yukarıçavuş (0.32 g) and the biggest seed sample from Gadanalalan (1.80 g). Significant variation was observed at Yukarıçavuş.

TABLE II. RANGE OF SEED WEIGHT (G) AT PLUM SITES

Site	Min.	Max.	Mean	Variation	St. error
Sarisu	0.40	1.10	0.68	0.56	0.17
Gadanalalan	0.48	1.80	0.73	1.67	0.25
Kilisealan	0.48	1.12	0.73	0.64	0.19
Yukarıçavuş	0.32	1.48	0.84	2.19	0.26

Table 3 shows the frequency distribution of ratio of seed by weight which ranged from 5 and 27 % at sites. The lowest ratio of seed by weight was recorded at Kilisealan with 5 % while the highest ratio was obtained at Sarısu with 27 %. The biggest variation was noticed at Sarısu.

TABLE III. FREQUENCY DISTRIBUTION OF RATIO OF SEED BY WEIGHT (%)

Site	Min.	Max.	Mean	Variation	St. error
Sarisu	6	27	13	464	4.94
Gadanalalan	7	22	12	347	3.65
Kilisealan	5	25	10	428	5.01
Yukarıçavuş	7	20	10	389	3.49

Five different colours (yellow, orange, pink, red and dark red) were observed as skin colour at all sites (Table 4). Red colour samples were more common than the other colours with approximetly 40 % in all sites. The amount of dark red skin colour samples were relatively rare.

TABLE IV. FREQUENCY DISTRIBUTION OF SKIN COLOUR BY SITES (%)

Site	Min.	Max.	Mean	Variation	St. error
Sarisu	15	23	18	21	15
Gadanalalan	13	12	18	16	13
Kilisealan	22	23	18	16	22
Yukarıçavuş	44	38	41	37	44

Three fruit shapes were recorded for plum fruits (Table 5). Round and flat-rounded shape samples being approximately same in numbers were much more than heart-shaped samples.

TABLE V. FREQUENCY DISTRIBUTION OF FRUIT SHAPE BY SITES (%)

Shape	Yukarıçavuş	Gadanalalan	Kilisealan	Sarisu
Round	56	38	35	37
Flat-Round	26	42	35	37
Heart	16	20	30	26
TOTAL	100	100	100	100

The most fruit samples examined were found as rough-fibred or fleshy, little juicy, sour and much aromatic. Nevertheless, a few sample were found sweet to be eaten.

The observation of pomological characteristics of plum populations is one of the ways to determine existing variability among them.

From the findings of pomological characteristics it can be concluded that there were significant differences were observed in plum trees for fruit colours and fruit weight within and between sites.

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