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Evaluation of Early, Mid and Late Varieties for Apple Growing Areas of NWFP at Germ Plasm Unit (Fruits) Biakan, Matta, Swat

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Abstract: This trial was conducted to identify and select promising early, mid and late varieties for apple growing areas of NWFP. Twelve exotic varieties were put under trial and it was found that four varieties come under each group. Among these varieties, one variety in each group was selected which showed superiority in different fruit characteristics. It was found that Treco gala out of the four varieties comes in the early group, Jona gored out of the four comes in the mid season group of varieties while Pink lady was the best variety out of the four late maturing varieties.

Key words: Apple, varieties, evaluation, Swat

Introduction

Apple (*Malus pumila*) is the most familiar and easily growing fruit of the temperate zone. It has numerous varieties within the genus *Malus*. In Malakand division total area under apple in 1998-99 was 3163 ha which produced 24242 tons of fruits (Agricultural Statistics of NWFP). Wild apples are found over much of Europe, in the Caucasus region, in middle Asia (e.g., Kazakhstan) and China. It is generally considered that the domesticated apple derived from complex hybrids of several wild species of *Malus*. The botanical name of the common apple has been variously referred to as *Malus Pumila*, *Malus domestica* or *Malus sylvestris* although it is now generally referred to as *M. domestica*.

The apple has long been associated with western civilization, it was probably cultivated in Greece as early as 600 BC but remains of apples have been found in excavated sites of prehistoric lake dwellers in Northern Italy and Switzerland. The food value of apple is high and a 100 gm edible portion of apple contains 84.4% water, 0.2% protein, 0.6% fat, 14.1% carbohydrates, 90IU vitamin C, 110 mg potassium, 0.8 mg fiber and 56 calories.

Apple is the major commercial/cash crop of Malakand division. Many varieties have been introduced into the area through the Agricultural Research System. Most of the apple varieties due to certain problems i.e., apple scab, pollination and other diseases could not be adopted in the area. The PHP imported new varieties with suitable pollinizer for study and evaluation for the area. These varieties include early, mid and late season varieties to expand the availability period. The best performing varieties will be registered with FSCRD before distribution among the growers.

Khan *et al.* (1985) tested 25 apple varieties in Swat and found that Raritan, DIR-78T2, Yellow Delicious, Vestabela, Red Melba and Fasse Pamac were early varieties while NJ-53, Valmore, Stark-Jan-Grimes, July Red, Mallus Delicious, Mollies Delicious, Haralson were mid season varieties. NJ-56 and Mutus turned out to be late season varieties.

Misic *et al.* (1993) stated on the basis of previous studies, a new varietal assortment for the country is recommended, including (1) varieties for commercial orchards (2) varieties of local importance (3) promising varieties (4) varieties with diseases, pest resistance for production of better quality fruit with minimum pesticide use. Descriptions are given of these recommended in each of these groups: as leading varieties for commercial orchards are Jona gold, Golden delicious, Melrose and Idared while supplementary ones are Vesta, Bella, Summer red, Acane, Elstar, Jonathan and its red mutants. Gloster 69, Richaved delicious, Cadell and Grany Smith. Varieties of group 2 are Mantet, Erich Neumann's Roter James Grive, Roter Boskoop, Mutsu and Cacanska Pozna, those of group 3 are Eva, Red mutant of Elstar, Royal gala, Red mutants of Jona gold and Fuji and its mutants and those of group 4 are Proma, Shay's seedling TNR10 T23, Freedom, Liberty, Champion Krstovaca, Budimka and Sumatovka.

Radicati *et al.* (1991) described that as a result of work during 1981 and 1982 to identify and collect old varieties growing in different areas of Italy, 47 local varieties were identified and the best are described with details of origin (when known), distribution, yield and vigor and the characteristics, utilization and keeping quality of the fruit. The most promising were Carla, Verdese, Contessa Gambafina, Rave Vero, Rave Verda, Rave Grigio, Carpendu Bianco and Calabria.

Grauslund (1988) planted two-year-old apple trees in spring 1982 and evaluated for yield, fruit size, color and appearance, tree size and planting

date in 1984-87. Clones shaer and 150-9FRD showed the best yields (80 and 79 kg tree⁻¹ respectively) and fruit weight (both 168 g an average). Fruits of the dark red clone lying by (obtained from another planting) were rated best for appearance, followed by these of the red to light red clones Frederiksberg, Idalund and 150-9FRD.

Grauslund (1988) budded 9 clones of the apple cultivar McIntosh on M-26 rootstock and were evaluated for yield and fruit quality. None of the clones overcame the problems of irregular shaped fruit and bruising. The highest mean yield per tree (1983-86) was produced by Tetraploid (57 kg) which also produced the largest fruits (160 gms). Mor spur, Mac spur and Bright had the best scores for fruit appearance.

Grauslund (1988) budded eleven Golden delicious clones and 10 Golden like cultivar on M-26 rootstock and were evaluated during 1981-86. During the hard winters of 1981-82 and 1984-85, the clones H 831 and Klion B and the cultivar Honey gold and Blushing golden were the most frost resistant. Most Golden like cultivars gave poor performances in Danish conditions. Klion B, EMLA and H831 gave the highest yields of large fruit. Honey gold had good growth and yield characteristics and fair fruit quality. This study was started to evaluate promising early, mid and late varieties for apple growing areas and expand the availability period of fresh fruit supply to market.

Materials and Methods

Eight varieties of apple (2 plants of each variety) imported from England and four varieties (2 plant of each variety) from Australia were put under trial in 1996 for their performance and comparison. All these varieties are on dwarf rootstock for quick and valid evaluation. This trial was established at GPU (fruit) Biakan, Tehsil Matta (Upper Swat) at an altitude of about 1500 meters. This is a high chilling area and fit for commercial apple production. Management and cultural practices were regularly carried out in the experiment. Data regarding various parameters were recorded for three consecutive years (1998-2000). Varieties tested at GPU (F), Biakan were Royal Gala, Mondial Gala, Treco Gala, Gala Must, Jonica, Jona Gored, Golden Delicious, Fiesta, Pink Lady, Sun Downer, Naga FU-2 and Lady Williams. As the experiment is non-replicated, so we have used standard deviation and t-test and finally found out critical difference for comparing two means (Dennis and Krishna, 1988).

Results and Discussion

First flowering and days to fruit set: It is clear from data that most of the varieties have same time of flowering and fruit set. Pink lady and Sun downer were earlier in flowering and significantly different from other varieties while the rest of the varieties have completed flowering and fruit set within one week (Table 1). So, approximately all the varieties have same time of flowering and fruit set. Flowering at the same time is very helpful in cross-pollination and as a result the precocity of variety increases.

Picking and days to maturity: There was a very clear difference between varieties picking and maturity time (Table 1). On the basis of data the varieties were significantly different from each other and divided into three groups, early, mid and late. Data shows that Gala group matured in mid August and took 135 days while Jonica, Jona Gored, Golden delicious and Fiesta matured in the month of September and took 167-170 days. The rest

Table 1: Flowering, fruit set, days to fruit set, picking dates, days to maturity, number of fruits Kg⁻¹ and yield acre⁻¹ of apple varieties (Av.. three years data).

Varieties	First flowering	Fruit set	Days to fruit set	Picking	Maturity days	No. fruit kg ⁻¹	Yield T acre ⁻¹
Royal Gala	7/4AB	17/4	10AB	19/8	135D	6.97B	3.33CB
Mondial Gala	8/4A	17/4	9ABC	19/8	135D	6.84B	3.67B
Treco Gala	7/4AB	19/4	12A	19/8	135D	6.27B	6.92A
Gala Must	9/4A	18/4	9ABC	19/8	135D	6.34B	4.77B
Jonica	8/4A	19/4	11A	22/9	168C	4.48C	3.32CB
Jona Gored	6/4ABC	17/4	11A	2/9	170C	4.41C	3.54CB
Golden Delicious	9/4A	18/4	9ABC	22/9	167C	4.83C	2.82CB
Fiesta	8/4A	18/4	10AB	11/9	168C	6.19B	1.07D
Pink Lady	2/4D	13/4	11A	8/12	250A	5.68B	3.10CB
Sun Downer	2/4D	12/4	10AB	8/12	250A	8.70A	2.55CB
Naga Fu-2	7/4AB	18/4	11A	2/12	239AB	8.86A	0.75D
Lady Williams	9/4A	19/4	10AB	8/12	243A	8.28A	2.97CB

CD at 5% level for first flowering = 1.59, CD at 5% level for days to fruit set = 1.056, CD at 5% level for days to maturity = 7.81, CD at 5% level for number of fruit kg⁻¹ = 1.32, CD at 5% level for yield acre⁻¹ = 1.22, CD = Critical difference

Table 2: Taste, color, shape, aroma and firmness of apple varieties (average of first three years data)

Varieties	Taste	Color	Shape	Aroma	Firmness
Royal Gala	Sweet	Red on yellow ground	Round to oblong	Good	Firm
Mondial Gala	Sweet	Red on yellow ground	Round to oblong	Good	Firm
Treco Gala	Sweet	Red on yellow ground	Round to oblong	Good	Firm
Gala Must	Sweet	Dark red yellow	Round to oblong	Good	Firm
Jonica	Sweet	Light red over green ground	Globose flat	Good	Firm
Jona Gored	Sweet	Dark red over green ground	Globose flat	Good	Firm
Golden Delicious	Sweet	Yellowish green on golden ground	Globose	Good	Firm
Fiesta	Less acidic	Purple red over yellow ground	Flat	Normal	Normal
Pink Lady	Sweet	Purple red over yellow green ground	Round to oblong	Good	Firm
Sun Downer	Sweet	Purple red over green ground	Round to oblong	Normal	App. Firm
Naga Fu-2	Less Sweet	Red over green ground	Round to oblong	Normal	Firm
Lady Williams	Sweet	Purple red over green ground	Round to oblong	Normal	App. Firm

of the four Australian varieties were matured in the month of December and took maximum days to maturity (239-250).

Number of fruit kg⁻¹ and fruit yield: In Gala group maximum fruit size and fruit yield was recorded in Treco Gala followed by Gala Must while minimum was recorded by Royal Gala. In the second group Jona Gored was best in these characters followed by Jonica while in Fiesta fruit size and yield was lowest in this group. In the late maturing varieties Pink Lady was the leading variety followed by Lady William while lowest fruit size and yield was recorded by Naga Fu-2. It is clear from data (Table 1) that fruit size of most of the varieties in one group was significantly different from the other groups. Maximum fruit size was recorded in the mid season group followed by Pink lady in the late season group and Gala group varieties. In all the three groups of varieties maximum fruit size was recorded in Jona gored followed by Jonica. While minimum fruit size was recorded in Naga Fu-2. In case of yield, Treco gala was significantly different and produced maximum yield followed by Gala must while significantly lowest yield was recorded by Naga Fu-2. Data was recorded for the first three years (1998-2000). All these varieties will start commercial bearing from 2001 and onward.

Taste and color: All the varieties tested were sweet except Fiesta which was light acidic. In case of color only Golden delicious was yellow variety, while the rest of varieties were mostly red on yellowish green ground and most of the late varieties were purple red on green ground.

Shape, aroma and firmness: Data (Table 2) shows that early and late varieties were round to oblong in shape while Jonica, Jona Gored were globose flat and Golden delicious was globose in shape. Fiesta was flat in shape and this type of variety is not commonly like by the consumers. In case of aroma and firmness most of the varieties in all the groups were good in aroma and firm in nature. In second group Fiesta was not so much firm and aroma was not completely developed. In the late varieties Pink Lady was on top in aroma and firmness while the rest of the varieties were normal and acceptable to the consumers.

Apple is the cash crop of Malakand division and the area needs improved varieties having different maturity time. So on the basis of current study, we have evaluated early, mid and late season varieties for the apple growing areas of NWFP. Khan *et al.* (1985) also evaluated 15 varieties out of 25 of different maturity time but presently there is not even a single variety exists in commercial form. So the introduction of new commercial varieties is essential. It will enable the growers and providing them choices of planting

early, mid and late varieties for fetching high prices due to supply of their produce for a longer period of time to the markets.

Significance/Novelty of the manuscript (evaluation of early, mid and late varieties for apple growing areas of NWFP at germ plasm unit (fruits), Biakan, Matta, Swat): Apple is the major commercial/cash crop of Malakand division. Many varieties have been introduced into the area through the Agricultural Research System. Most of the varieties due to certain problems, i.e., apple scab and pollinizer could not adopted in the area. The Project for Horticulture Promotion in NWFP has imported new varieties with suitable pollinizer for study and evaluation. The varieties include early, mid and late season varieties to expand the availability period i.e., fresh fruit supply to the market. The varieties will be evaluated according to the area, country choice and climatic suitability. The best performing varieties will be registered with FSCRD before distribution among the growers. The current research findings of evolving new apple varieties are significant because one early maturing (Treco gala), one mid season (Jona gored) and one late maturing (Pink lady) have been selected at GPU (F), Biakan, ARSNM, Swat for the apple growing areas of NWFP. After the full introduction of these new varieties, the growers of the area will have choices of planting different varieties for fetching high prices due to supply of their produce for a longer period of time to the markets. All these varieties are quick bearing, having good fruit qualities and facing no problem of apple diseases.

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