

INTRODUCTION

Potato is an important food as well as cash crop. Being rich in starch and having highest productivity per unit area, it has great potential to address the challenge of food security. In many European countries, potato serves as staple food. In Pakistan also, potato is the part and parcel of common man's diet. In Pakistan, potato is cultivated all around the country from mountains to shores. In Punjab, its cultivation is concentrated in the districts of Okara, Pakpattan, Sahiwal and Kasur, so called the "Potato core area".

Asia and Europe are the world's major potato producing regions, accounting for more than 80% of world production. Potato plays a strong role in developing countries with its ability to provide nutritious food for the poor and hungry. The demand for potato is growing both as fresh and processed food.

Potato is reported to have been introduced in the sub-continent during sixteenth century. Potato had been cultivated in Nepal for a long time. In Pakistan, potato production has been increased 146 times from 24 thousand tons to 3507.1 thousand tons from 1947 to 2013-14. In Punjab, potato was grown on **149.4** thousand hectares with a production of **2761.1** thousand tones with an average yield of 18.5 t/ha (2013-14), which is decreased, first due to severe incidence of frost and later by Late Blight incidence as compared to 22.4 t/ha in the previous year. The average yield of potato in Pakistan is far low in world prospective so this is the area to work at. Genetic diversity in potato cultivars has been studied widely for high yield & disease resistance in locally adapted potato cultivars. The Research on Potato is concentrated at Potato Research Institute, Sahiwal, Potato Research Station, Sahawali (Sialkot), and Potato Breeding Research Sub-Station, Murree with the following SMART (specific, measurable, achievable, realistic & time bond) objectives:

- Development of high yielding, disease resistant, frost tolerant and good quality potato varieties through conventional breeding
- Introduction of disease/frost tolerance varieties with high yield potential and good potato quality
- Standardization of production technology for the elite strains
- Pathological studies to control Fungal, viral and other diseases
- Quality evaluation to feed the Potato Processing Industry
- Pre-basic and basic seed production through modern techniques of tissue culture

Multifarious research experiments on all above mentioned important aspects of Potato crop were planned and conducted at Potato Research Institute, Sahiwal and its sub formations i.e., Potato Research Station, Sahowali (Sialkot) and Potato Research Sub-Station, Murree.

TECHNICAL STAFF POSITION

Name of the Post	Total sanctioned strength	Filled	Vacant
Potato Research Institute, Sahiwal			
Director	1	1	-
Botanist	1	1	-
Assistant Botanist Potato	1	-	1
Assistant Research Officer (PBG)	4	2	2
Assistant Research Officer (PP)	1	-	1
Assistant Research Officer (FT)	1	-	1
Total	9	4	5
Potato Research Station (Sialkot)			
Potato Botanist	1	1	-
Assistant Botanist Potato	1	1	-
Assistant Research Officer (PBG)	2	-	2
Assistant Plant Pathologist	1	1	-
Total	5	3	2
Potato Research Sub-station, Faisalabad			
Assistant Food Technologist	1	-	1
Assistant Research Officer (PBG)	2	-	2
Total	3	0	3
Potato Research Sub Station (Murree)			
Assistant Research Officer (PBG)	1	1	-
Grand Total	18	8	10

1..PLANT BREEDING

A..Potato Research Institute Sahiwal

1. Maintenance, characterization and screening of germplasm against biotic and abiotic stresses.

A total of 152 strains/varieties were maintained. Out of these, nine new strains were tested for different characteristics. The material was sown on **11.11.2014**, keeping plant to plant and row to row distances as 20 & 75 cm, respectively. The plot size so maintained was 6.0m x 0.75 m. The trial was conducted according to single row design. Standardized agronomic and plant protection measures were adopted. Harvesting was done on **24.04.2015**. Data regarding tuber grades/diseases and tuber yield were recorded. The results are presented in Table No.1

Table No. 1 Performance of germplasm during 2014-15

Rank	Variety	Emr %	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	HZD-03-941	90.0	21.0	74.0	5.0	0.0	6.0	1.0	23.7
2	Triplo	93.3	8.0	92.0	2.0	1.0	0.0	0.0	21.5
3	Masai	86.0	28.0	70.0	2.0	2.0	6.0	0.0	20.8
4	HZD-02-1499	76.6	12.0	84.0	4.0	0.0	0.0	1.0	20.6
5	Amarin	86.6	11.0	86.0	3.0	0.0	4.0	0.0	20.2
6	HZD-04-684	66.6	15.0	81.0	4.0	0.0	0.0	0.0	20.0
7	Dirosso	86.6	10.0	88.0	2.0	0.0	0.0	0.0	16.4
8	VDW-02-171	80.0	16.0	80.0	4.0	0.0	0.0	0.0	16.2
9	Toscana	83.3	38.0	61.0	1.0	1.0	7.0	1.0	14.3

According to the data of the parameters shown in the Table No.1, it was observed that maximum tuber yield (**23.7 t/ha**) was recorded in exotic variety HZD-03-941 followed by the Triplo with yield value of **21.5 t/ha** and minimum (**14.3 t/ha**) was recorded in exotic variety Toscana. Tuber grade data indicated that the variety HZD-03-941 produced maximum percentage (5.0%) of ration size tubers. Regarding disease infestation, it was noticed that maximum scab incidence (**2.0%**) was recorded on the variety Masai, maximum rhizoctonia incidence was observed on the variety Toscana and maximum tuber cracking (**1.0%**) was seen on the varieties HZD-03-941, HZD-02-1499 & Toscana.

2. Primary evaluation of new strains.

14 new strains alongwith two checks were evaluated The material was sown on **06.11.2014**. Plant to plant and row to row distances were maintained as 20 cm and 75 cm, respectively. The plot size was 6.0m x 0.75 m. The trial was conducted according to the Randomized Complete Block Design with two replications. Normal agronomic and plant protection measures were carried out in the crop. Harvesting was done on **13.04.2015**. Data regarding emergence %age, tuber grades, diseases infestation and tuber yield were recorded which are presented in below Table:-

Table No.2 Performance of strains/varieties in Primary trial at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 40-5	98.4	27.5	72.5	0.0	0.0	33.5	2.5	28.9
2	SL 41-2	98.4	34.5	65.5	0.0	0.0	33.5	1.5	25.6
3	SL 40-4	96.7	27.0	73.0	0.0	0.0	32.5	0.0	25.0
4	SL 40-3	95.0	20.0	80.0	0.0	4.0	31.5	1.5	23.4
5	SL 41-7	96.7	33.0	67.0	0.0	0.0	13.5	2.5	22.8
6	SL 41-1	98.4	47.5	52.5	0.0	0.0	11.0	0.0	22.2
7	SL 42-2	100.0	57.5	42.5	0.0	0.0	41.0	0.0	21.7
8	SL 41-11	93.4	37.5	62.5	0.0	0.0	31.0	4.5	21.1
9	Fsd white	93.4	13.0	85.0	2.0	4.5	67.5	0.0	21.1
10	SL 42-1	96.7	34.5	65.5	0.0	0.0	21.5	1.5	17.8
11	SL 42-5	93.4	53.5	46.5	0.0	0.0	31.0	0.0	15.6
12	Kuroda	85.0	13.0	83.5	3.5	7.5	26.5	2.0	14.5
13	SL 41-3	88.4	66.0	34.0	0.0	0.0	17.0	0.0	13.3
14	SL 41-10	91.7	67.5	32.5	0.0	0.0	23.5	5.5	12.2
15	SL 42-6	68.4	53.5	46.5	0.0	0.0	10.0	0.0	11.7
16	SL 41-9	91.7	81.5	18.5	0.0	0.0	52.5	3.5	9.5
LSD 5%		11.848	7.186	7.127	0.377	0.953	6.296	1.083	5.193

It is revealed from the data that the strain SL 40-5 gave the highest yield of **28.9** t/ha followed by SL 41-2 with **25.6** t/ha tuber yield, while the lowest yield was produced by the strain SL 41-9 (**9.5** t/ha). All the entries showed normal emergence except SL 42-6 which gave 68.4% emergence. Maximum emergence was shown by the strain SL 42-2 (**100.0%**). Regarding tuber grades, it was noted that the commercial check variety Kuroda produced maximum ration size tubers i.e. **3.5%** whereas all the local strains did not produce ration size tubers at all. The commercial check varieties Faisalabad White & Kuroda produced lowest percentage of small size tubers (**13.0%** of each) whereas maximum small size tubers (**81.5%**) were produced by the

strain SL 41-9. Regarding disease infestation, it was noted that most of the strains showed resistance against common scab .Maximum scab incidence (**7.5%**) was recorded on the commercial check variety Kuroda, maximum rhizoctonia attack (**67.5%**) was recorded on the check variety Faisalabad White and maximum tuber cracking (**5.5%**) was noted on the strains SL 41-10.

3.1. Secondary evaluation of potato strains (Set-I).

Eight new strains alongwith two check varieties were tested for their performance. The material was sown on **05.11.2014** by keeping plant to plant and row to row distances as 20 cm and 75 cm, respectively with the plot size 6 .0 m x 1.5 m. The trial was conducted according to RCB design with three replications. Standardized agronomic and plant protection measures were carried out during entire crop season. The harvesting was done on **13.03.2015**. Regarding the recorded data, the results are presented in Table 3.

Table No. 3. Performance of strains/varieties In Secondary Trial Set-I at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 28-51	96.1	18.7	78.0	3.3	0.3	1.3	0.3	35.8
2	SL 16-7	98.3	11.0	85.7	3.3	2.0	3.7	0.0	34.5
3	SL 28-72	97.2	11.7	86.0	2.3	0.3	13.0	0.0	32.6
4	SL 28-22	92.8	21.0	75.0	4.0	3.0	0.3	0.0	31.8
5	SL 22-4	95.0	22.0	78.0	0.0	0.3	0.3	0.0	30.0
6	SL 28-21	97.8	60.0	40.0	0.0	0.7	0.7	2.0	30.0
7	SL 18-25	96.7	14.0	81.7	4.3	2.7	0.7	0.0	26.3
8	Simply Red	93.3	15.0	82.7	2.3	0.0	3.0	1.3	24.8
9	Sante	97.8	27.7	72.3	0.0	2.3	8.7	0.3	20.4
10	SL 21-10	98.9	77.7	22.3	0.0	2.7	0.0	0.0	20.0
LSD 5%		6.737	4.499	4.378	1.728	1.158	1.931	1.007	5.246

It is revealed from the above Table that the strain SL 28-51 gave highest yield **35.8** t/ha followed by SL 16-7 which yielded 34.5 t/ha. The strain SL 21-10 produced the lowest tuber yield (20.0 t/ha). As far as emergence %age is concerned, it was noticed that all of the strains showed normal emergence. Local strain SL 21-10 showed maximum emergence (**98.9%**) whereas the strain SL 28-22 showed lowest emergence (**92.8%**). Regarding tuber grades, it was noticed that strain SL 18-25 produced maximum ration size tubers i.e. **4.3%**. The lowest small size tuber percentage (**11.0%**) was produced by the strain SL 16-7. whereas maximum small size tuber percentage (**77.7%**) was produced by the strain SL 21-10. Regarding disease infestation it

was noticed that most of the strains showed resistance to the attack of tuber diseases. Maximum scab incidence (**3.0%**) was recorded on strain SL 28-22. Maximum rhizoctonia attack (**13.0%**) was recorded on strain SL 28-72. Maximum tuber cracking (**2.0%**) was noted in the strain SL 28-21.

3.2. Secondary evaluation of potato strains (Set-II).

Seven new strains were tested alongwith two check varieties The material was sown on **05.11.2014** by keeping plant to plant and row to row distances as 20 cm and 75 cm, respectively with the plot size 6.0 m x 1.5 m. The trial was conducted according to RCB design with three replications. Standardized agronomic and plant protection measures were carried out during entire crop season. The harvesting was done on **25.03.2015**. Regarding the recorded data, the results are presented in Table 4.

Table No. 4. Performance of strains/varieties In Secondary Trial Set-II at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 24-9	97.8	11.7	86.6	1.7	0.0	12.3	0.7	30.6
2	SL 28-15	90.5	11.7	86.6	1.7	3.7	8.0	0.7	29.1
3	SL 18-1	98.3	45.7	54.3	0.0	0.0	0.0	0.0	27.8
4	SL 28-16	93.9	11.7	86.0	2.3	0.7	11.3	0.0	27.6
5	SL 28-32	95.0	24.3	74.4	1.3	0.0	7.3	0.0	26.3
6	Simply Red	95.5	27.0	73.0	0.0	0.0	5.3	0.0	23.5
7	SL 28-18	95.0	26.7	72.3	1.0	3.0	2.7	0.0	23.3
8	SL 21-9	99.4	74.0	26.0	0.0	0.0	10.7	0.0	18.1
9	Sante	96.1	35.7	64.3	0.0	0.0	12.3	0.0	14.8
LSD 5%		3.749	4.021	3.980	0.865	0.971	3.238	0.486	2.886

It is revealed from the above Table that the strain SL 24-9 gave highest yield **30.6** t/ha followed by SL 28-15 which yielded **29.1** t/ha. The commercial check variety Sante produced the lowest tuber yield (**14.8** t/ha). As far as emergence %age is concerned, maximum emergence was shown by the strain SL 21-9 (**99.4%**) and lowest emergence was shown by the strain SL 28-15 (**90.5%**). Regarding tuber grades, it was noticed that strain SL 28-16 produced maximum ration size tubers i.e. **2.3%**. The lowest small size tubers (**11.7%**) were produced by the strains SL 24-9, SL 28-15 & SL 28-16, whereas maximum small size tuber percentage (**74.0%**) was produced by the strain SL 21-9. Regarding disease infestation it was noticed that maximum scab incidence (**3.7%**) was recorded on strain SL 28-15. Maximum rhizoctonia attack (**12.3%**) was recorded on

strain SL 24-9 & commercial check variety Sante. Maximum tuber cracking (**0.7%**) was noted in the strains SL 24-9 & SL 28-15.

4. Evaluation of potato strains/varieties against frost incidence at PRI, Sahiwal.

Frost is a sever threat to potato crop during autumn season. Researchers are trying to select frost tolerant varieties to overcome this issue. This study was carried out to test the performance of **10** elite strains against frost at Potato Research Institute, Sahiwal. Sowing was done on **10.11.2014**, keeping plant to plant and row to row distances as 20 & 75 cm, respectively. The plot size was maintained as 6.0 m x 0.75 m. The trial was conducted according to RCB design with three replications. Appropriate agronomic and plant protection measures were carried out in the crop. The harvesting was done on **17.04.2015**. The results are presented in Table 5.

Table No. 5. Performance of strains/varieties against frost at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	FD 77-4	97.8	7.7	88.3	4.0	0.0	5.3	0.3	32.9
2	FD 75-6	97.8	6.0	90.0	4.0	0.0	26.7	2.0	32.2
3	SL 10-4	87.8	5.7	91.3	3.0	0.0	3.7	0.0	28.5
4	SL 1-4	94.4	14.0	84.7	1.3	0.0	3.3	0.0	27.1
5	FD 60-2	97.8	13.0	86.3	0.7	0.0	15.7	0.7	26.7
6	SL 11-4	97.8	10.7	86.3	3.0	0.0	21.7	0.0	24.8
7	SL 10-22	97.8	8.3	89.0	2.7	0.0	32.3	0.0	23.3
8	SL 8-5	97.8	9.7	89.3	1.0	0.0	0.7	0.0	19.6
9	SL 9-14	90.0	17.0	82.7	0.3	0.0	27.3	0.0	18.9
10	SL 7-45	90.0	31.0	69.0	0.0	0.0	5.3	0.0	18.2
LSD 5%		9.586	3.660	3.729	1.357	NS	4.140	0.643	3.077

During the crop growth period especially in December & January (peak frost incidence period) no frost incidence was observed. So screening of strains against frost could not be undertaken. However the Table shows that the strain FD 77-4 gave highest yield **32.9** t/ha followed by FD 75-6 which yielded **32.2** t/ha. The lowest tuber yield (**18.2** t/ha) was produced by the strain SL 7-45. As far as emergence %age is concerned, maximum emergence (**97.8%**) was shown by the strains FD 77-4, FD 75-6, FD 60-2, SL 11-4, SL 10-22 & SL 8-5. and lowest emergence was shown by the strain SL 10-4 (**87.8%**). Regarding tuber grades, it was noticed that strain FD 77-4 & FD 75-6 produced maximum ration size tubers i.e. **4.0%** of each. The lowest small size tubers (**5.7%**) were produced by the strain SL 10-4, whereas maximum small size

tuber percentage (**31.0%**) was produced by the strain SL 7-45. Regarding disease infestation it was noticed that all the strains showed resistance against common scab incidence. Maximum rhizoctonia attack (**32.3%**) was recorded on strain SL 10-22. Maximum tuber cracking (**2.0%**) was noted in the strain FD 75-6.

5.1. Varietal yield trial of red & white skinned potato strains (Set-I)

Eight strains with two standard entries were evaluated at Potato Research Institute, Sahiwal. The material was sown on **21.10.2014**, keeping 20 cm plant to plant and 75 cm row to row distances. So the plot size was kept was 8.0 m x 2.25 m. The trial was laid out according to RCB design with three replications. Normal agronomic and plant protection practices were adopted. Harvesting was done on **24.02.2015**. Data regarding emergence %age, tuber grades, disease infestation and yield were recorded which are presented in below Table:-

Table No. 6. Performance of strains/varieties in varietal trial (Set-I) at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 14-32	93.3	14.0	81.0	5.0	30.7	0.0	1.0	29.6
2	SL 14-37	88.3	15.7	77.0	7.3	6.7	0.0	0.3	28.5
3	SL 13-33	93.0	11.3	84.7	4.0	7.7	32.0	0.0	27.8
4	SL 15-21	94.7	32.7	67.3	0.0	2.3	0.0	0.0	26.7
5	SL 13-64	91.4	22.7	73.6	3.7	5.7	20.7	0.0	23.7
6	Simply Red	91.1	19.0	78.3	2.7	4.0	10.0	0.7	23.7
7	SL 14-3	79.4	21.0	74.7	4.3	30.0	0.0	2.3	23.1
8	Sante	94.2	20.0	78.0	2.0	3.0	25.7	1.0	20.6
9	SL 13-16	95.0	12.7	84.3	3.0	1.7	5.7	0.0	17.4
10	SL 13-18	97.2	26.7	72.3	1.0	3.7	9.3	0.0	15.7
LSD 5%		8.180	5.572	5.203	1.308	3.031	3.295	1.443	4.586

Results presented in above Table revealed that the highest tuber yield (**29.6 t/ha**) was recorded from the line SL 14-32 followed by SL 14-37 (**28.5 t/ha**). The lowest tuber yield (15.7 t/ha) was produced by the strain SL 13-18. Almost all the strains/varieties showed emergence in normal range except SL 14-3 which showed **79.4%** emergence. Maximum emergence (**97.2%**) was recorded in the strain SL 13-18. Regarding tuber grades, it was noted that the SL 14-37 produced maximum ration size tubers i.e. **7.3 %** while SL 15-21 did not produce any ration size tuber at all. Maximum small size tubers (**32.7%**) were recorded in the strain SL 15-21. Regarding disease infestation, it was noted that the maximum scab infestation (**30.7 %**) was

noted in the strain SL 14-32. Whereas maximum rhizoctonia (**32.0%**) was observed on the strain SL 13-33 and maximum tuber cracking (**2.3 %**) was observed in the strain SL 14-3.

5.2. Varietal yield trial of red & white skinned potato strains (Set-II).

Eight strains alongwith two check varieties were tested for their performance at Potato Research Institute, Sahiwal. The material was sown on **21.10.2014** by keeping plant to plant and row to row distances as 20 cm and 75 cm, respectively with the plot size 8.0 m x 2.25 m. The trial was conducted according to RCB design with three replications. Standardized agronomic and plant protection measures were carried out during entire crop season. The harvesting was done on **25.02.2015**. Regarding the recorded data, the results are presented in Table 7.

Table No. 7. Performance of strains/varieties in varietal trial (Set-II) at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 13-43	87.0	16.0	75.3	8.7	3.3	100.0	0.0	26.7
2	SL 15-15	84.4	9.0	85.3	5.7	3.3	0.0	2.7	25.0
3	SL 14-15	80.6	17.7	72.6	9.7	5.7	0.0	1.3	24.6
4	SL 15-10	85.6	27.0	70.0	3.0	3.0	0.0	0.0	24.1
5	SL 14-13	84.7	20.0	76.0	4.0	13.7	0.0	0.0	22.4
6	Santé	92.2	20.7	76.0	3.3	6.3	18.7	0.7	22.4
7	SL 13-39	86.7	15.7	76.6	7.7	7.7	49.0	4.3	21.1
8	SL 14-6	92.2	18.3	78.3	3.4	2.7	3.7	0.7	20.9
9	SL 13-4	87.5	25.7	71.3	3.0	7.0	0.0	0.0	20.4
10	Simply Red	84.7	12.3	85.4	2.3	2.3	6.7	1.0	19.8
LSD 5%		10.138	4.350	3.942	1.948	2.197	4.055	0.635	2.179

It is revealed from the above table that the strain SL 13-43 gave highest yield **26.7 t/ha** followed by SL 15-15 which yielded **25.0 t/ha**. The commercial check variety Simply Red produced the lowest tuber yield (19.8 t/ha). As far as emergence %age is concerned, it was noticed that the check variety Sante & the strain SL 14-6 showed maximum emergence (**92.2%**) whereas the strain SL 14-15 showed lowest emergence (**80.6%**). Regarding tuber grades, it was noticed that strain SL 14-15 produced maximum ration size tubers i.e. **9.7%**. The lowest small size tubers (**9.0%**) were produced by the strain SL 15-15, whereas maximum small size tuber percentage (**27.0%**) was produced by the strain SL 15-10. Regarding disease infestation, it was noticed that maximum scab incidence (**13.7%**) was recorded on strain SL 14-13. Maximum

rhizoctonia attack (**100%**) was recorded on the strain SL 13-43. Maximum tuber cracking (**4.3%**) was noted in the strain SL 13-39.

6.1. Advanced varietal yield trial of red & white skinned potato strains (Set-I)

10 advance potato lines were evaluated against two standard entries i.e. Sante & Simply Red at Potato Research Institute, Sahiwal. The material was sown on **20.10.2014**, keeping 20 cm plant to plant and 75 cm row to row distances. The plot size was kept 8.0 m x 2.25 m. The trial was laid out according to the randomized complete block design with three replications. Normal agronomic and plant protection practices were adopted. Harvesting was done on **19.02.2015**. Data regarding emergence %age, tuber grades, disease infestation and yield were recorded which are presented below in Table No.8.

Table No. 8. Performance of strains/varieties in advanced varietal trial (Set-I) at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 9-13	86.4	19.7	69.6	10.7	5.7	7.7	5.3	38.3
2	SL 8-5	88.9	17.3	74.7	8.0	4.7	3.7	2.0	35.0
3	SL 10-4	89.7	9.7	81.0	9.3	1.3	0.0	1.3	33.3
4	SL 9-14	91.4	24.7	69.0	6.3	6.0	2.0	1.0	32.0
5	SL 10-9	93.1	10.7	79.0	10.3	11.7	2.3	0.7	31.3
6	SL 11-4	89.7	14.7	76.3	9.0	3.3	3.0	1.0	31.3
7	SL 7-21	92.2	20.0	74.0	6.0	4.0	7.3	3.3	30.4
8	Simply Red	90.8	18.0	78.0	4.0	3.3	0.0	3.0	30.2
9	SL 8-10	85.6	13.3	78.7	8.0	10.0	8.0	1.3	29.8
10	SL 4-26	81.4	10.0	83.3	6.7	4.0	6.0	8.0	27.8
11	Sante	94.2	24.0	73.7	2.3	4.7	2.7	1.0	25.4
12	SL 7-45	90.3	21.3	77.7	1.0	0.0	0.0	0.0	19.1
LSD 5%		11.392	4.421	5.967	3.139	3.291	2.598	1.293	7.622

It is shown by the results presented above that the highest tuber yield (**38.3 t/ha.**) was recorded in the strain SL 9-13 followed by SL 8-5 (35.0 t/ha). The lowest tuber yield (19.1 t/ha) was produced by the strain SL 7-45. All of the entries showed above 80% emergence. The maximum emergence (94.2%) was shown by the commercial check variety Sante. Regarding Tuber grades, it was noted that the strain SL 9-13 produced maximum ration size tubers (**10.7 %**). Minimum percentage of small size tubers (9.7%) was produced by the Strain SL 10-4. Regarding, tuber diseases, it was noted that maximum scab infestation (**11.7 %**) was noted in the

strain SL 10-9. Maximum rhizoctonia (**8.0%**) was observed on the strain SL 8-10. Maximum cracks (**8.0 %**) were observed in the strain SL 4-26.

6.2. Advanced varietal yield trial of red & white skinned potato strains (Set-II)

Nine advance potato lines were evaluated against two standard entries i.e. Sante & Simply Red at Potato Research Institute, Sahiwal. The material was sown on **20.10.2014**, keeping 20 cm plant to plant and 75 cm row to row distances. The plot size was kept 8.0 m x 2.25 m. The trial was laid out according to the randomized complete block design with three replications. Normal agronomic and plant protection practices were adopted. Harvesting was done on **19.02.2015**. Data regarding emergence %age, tuber grades, disease infestation and yield were recorded which are presented below in Table No.9.

Table No. 9. Performance of strains/varieties in advanced varietal trial (Set-II) at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	SL 11-50	88.1	11.0	80.3	8.7	1.0	1.7	0.3	39.4
2	UK-60	81.4	19.7	76.0	4.3	1.3	2.3	0.0	29.3
3	SL 1-62	85.3	15.0	79.7	5.3	1.7	7.3	4.0	28.7
4	SL 5-2	81.4	15.3	79.7	5.0	2.3	0.0	0.0	27.6
5	SL 1-4	73.9	12.7	84.3	3.0	2.3	2.0	0.7	25.6
6	Simply Red	83.3	15.7	80.6	3.7	2.0	2.7	2.7	24.4
7	SL 7-26	73.3	22.3	74.0	3.7	0.3	0.0	1.3	24.1
8	SL 1-74	80.3	12.3	81.4	6.3	2.3	4.7	7.3	23.9
9	Sante	82.8	23.0	75.3	2.7	2.7	0.0	0.7	21.3
10	SL 10-22	85.0	15.7	81.3	3.0	2.7	8.0	2.0	20.9
11	SL 1-47	68.6	12.7	82.3	5.0	1.3	11.7	1.7	19.3
LSD 5%		15.480	6.011	7.069	2.767	1.506	3.024	1.736	6.401

It is shown by the results presented above that the highest tuber yield (**39.4 t/ha.**) was recorded in the strain SL 11-50 followed by UK-60 (29.3 t/ha). The lowest tuber yield (19.3 t/ha) was produced by the strain SL 1-47. Most of the entries showed above 80% emergence except SL 1-4, SL 7-26 & SL 1-47. The maximum emergence (88.1%) was shown by the strain SL 11-50. Regarding Tuber grades, it was noted that the strain SL 11-50 produced maximum ration size tubers (**8.7 %**) and minimum small size tubers (11.0%). Maximum percentage of small size tubers (23.0%) was produced by the commercial check variety Sante. Regarding, tuber diseases, it was noted that less incidence of tuber diseases was observed on the strains / varieties. Maximum scab infestation (**2.7 %**) was noted in the commercial check variety sant  and local

strain SL 10-22. Maximum rhizoctonia incidence (**11.7%**) was observed on the strain SL 1-47. Maximum cracks (**4.0 %**) were observed in the strain SL 1-62.

7. Zonal varietal yield trial at PRI, Sahiwal

10 advance potato lines alongwith 2 commercial check varieties were evaluated against two standard entries i.e. Sante and Kuroda at Potato Research Institute, Sahiwal. The material was sown on **07.11.2014**, keeping 20 cm plant to plant and 75 cm row to row distances. The plot size was kept 6.0 m x 1.5 m. The trial was laid out according to the randomized complete block design with three replications. Normal agronomic and plant protection practices were adopted. Harvesting was done on **27.03.2015**. Data regarding tuber grades, disease infestation and yield were recorded which are presented below in Table No.10.

Table No. 10. Performance of strains/varieties In Zonal varietal trial at PRI, Sahiwal

Rank	Variety	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
			<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	FD 78-51	96.7	12.3	81.0	6.7	0.3	33.7	1.3	31.1
2	FD 75-6	97.2	12.0	79.3	8.7	0.0	39.3	1.3	30.4
3	FD 69-2	98.3	38.0	61.3	0.7	0.0	9.3	0.0	29.3
4	FD 63-1	98.3	11.7	85.3	3.0	2.7	6.0	0.0	29.3
5	FD 73-77	97.2	25.3	73.4	1.3	0.0	8.0	0.0	28.2
6	FD 76-12	84.4	11.0	84.7	4.3	5.0	15.7	0.0	27.8
7	FD 76-35	99.4	42.3	57.7	0.0	0.0	6.7	0.0	27.1
8	FD 78-21	95.0	10.3	86.0	3.7	5.0	82.0	1.3	26.7
9	FD 71-1	96.7	16.7	80.6	2.7	1.7	85.7	0.3	25.9
10	FD 73-108	91.1	10.3	87.4	2.3	4.0	90.0	0.0	23.7
11	Sante	98.9	35.0	64.0	1.0	0.0	19.3	0.0	17.4
12	Kuroda	92.8	17.0	82.3	0.7	2.7	81.0	0.7	14.8
LSD 5%		4.848	4.370	4.507	1.224	2.301	6.108	0.608	4.102

It is shown by the results presented above that the highest tuber yield (**31.1 t/ha.**) was recorded in the strain FD 78-51 followed by FD 75-6 (30.4 t/ha). All the local strains gave higher yield than both the standard varieties. The lowest tuber yield (14.8 t/ha) was produced by the commercial check variety Kuroda. The highest emergence was given by the strain FD 76-35 (99.4%) whereas lowest emergence was given by the strain FD 76-12 (84.4%). Regarding Tuber grades, it was noted that FD 75-6 produced maximum ration size tubers (**8.7 %**). The maximum small size tubers were produced by the strain FD 76-35 (42.3%). Regarding, tuber diseases, it was noted that maximum scab infestation (**5.0 %**) was noted in the strains FD 76-12 & FD 78-21.

Maximum rhizoctonia (**90.0%**) was observed on the strain FD73-108 and maximum tuber cracking (1.3%) was observed in the strains FD 78-51, FD 75-6 & FD 78-21.

8. National uniform potato yield trial

14 potato strains viz: FD 76-67, FD 77-4, FD 76-12, FD 81-1, FD 73-49, FD 76-59, FD 73-44, FD 73-110, FD 78-36, FD 73-75, SH-718, SH-1035, N-2005-1, N-2005-4, along with two commercial check varieties Kuroda & Sante were planted at Potato Research Institute Sahiwal, Vegetable Research Institute Faisalabad, NARC Islamabad and Potato Research Station, Sahowali (Sialkot). The trial planted at PRS, Sahowali (Sialkot) was completely destroyed by the heavy rains at the time of harvesting. The material was planted on 31.10.14, 14.11.2014 and 06.11.2014 respectively with 8.0 m x 2.25 m, 6.0 m x 2.25 m, and 3.6 m² plot size respectively according to Randomized Complete Block design with three replications. Plant to plant and row-to-row distances were kept 20 cm & 75 cm. Harvesting was done on 26.2.2015, 02.4.2015 and 25.2.2015 respectively. Data regarding emergence percentage, tuber grades, tuber diseases and tuber yield were recorded. The results are presented in the Tables 11-18.

Table No. 11. Emergence percentage of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	FD 73-44	98.4	80.6	95.3	91.4
2	SH-1035	96.9	81.1	95.7	91.2
3	FD 73-49	95.6	80.0	97.7	91.1
4	FD 81-1	96.7	80.0	91.0	89.2
5	Kuroda	97.2	76.7	93.0	89.0
6	FD 78-36	98.1	71.7	95.7	88.5
7	FD 73-75	96.7	80.0	86.3	87.7
8	FD 73-110	96.1	72.2	93.3	87.2
9	FD 77-4	96.1	69.4	87.3	84.3
10	FD 76-59	94.7	72.8	85.3	84.3
11	FD 76-67	89.7	76.7	83.0	83.1
12	Sante	96.4	61.7	90.7	82.9
13	FD 76-12	72.2	86.7	82.0	80.3
14	SH-718	93.9	53.3	86.7	78.0
15	N-2005-1	33.4	51.7	92.3	59.1

16	N-2005-4	50.0	32.8	81.3	54.7
LSD 5%		13.761	18.300	13.114	

The data presented in Table 11 shows that on an average basis maximum emergence percentage (**91.4%**) was recorded in the strain FD 73-44 followed by SH-1035 (**91.2%**) and minimum (**54.7 %**) was recorded in a strain N-2005-4. On the basis of location, the emergence percentage recorded at VRI, Faisalabad was lower as compared to the other locations. On individual basis, the strain N-2005-4 gave lowest emergence (32.8%) at VRI, Faisalabad location.

Table No. 12. Small size tuber (<35mm) of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	FD 76-12	10.0	10.0	27.3	15.8
2	FD 77-4	11.0	9.7	28.7	16.5
3	FD 76-67	11.3	10.3	39.1	20.2
4	FD 73-49	16.3	7.7	44.1	22.7
5	FD 73-110	12.3	11.0	46.2	23.2
6	FD 76-59	11.3	23.0	36.6	23.6
7	Kuroda	12.7	15.0	43.6	23.8
8	FD 73-44	16.7	9.0	45.6	23.8
9	FD 81-1	17.3	16.7	41.4	25.1
10	N-2005-1	19.3	12.0	57.0	29.4
11	SH-1035	24.0	11.7	52.9	29.5
12	N-2005-4	22.3	15.0	62.1	33.1
13	Sante	18.7	28.3	56.7	34.6
14	FD 78-36	28.3	16.0	62.3	35.5
15	FD 73-75	22.7	18.7	65.3	35.6
16	SH-718	19.7	19.0	69.1	35.9
LSD 5%		5.357	6.100	10.462	

The data presented in Table 12 shows that on an average basis, Minimum small size tuber percentage was recorded in the strain FD 76-12 (**15.8%**) followed by FD 77-4 (16.5%), whereas maximum on the strain SH-718 (**35.9%**). It was observed that the small size tuber percentage

remained high at NARC, Islamabad as compared to the other locations. On individual basis, the minimum small size tuber percentage was recorded in strain FD 73-49 at VRI, Faisalabad i.e. **7.7%** whereas maximum percentage of small size tubers was recorded in strain SH-718 at NARC, Islamabad where it was **69.1%**.

Table No. 13. Medium size tuber (35-55mm) of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	FD 76-12	81.7	83.7	64.9	76.8
2	FD 77-4	80.3	85.3	63.2	76.3
3	FD 73-110	82.4	88.3	49.8	73.5
4	FD 76-67	82.0	86.7	50.3	73.0
5	FD 76-59	80.7	76.0	60.6	72.4
6	Kuroda	82.6	84.3	49.3	72.1
7	FD 73-49	78.7	86.0	51.0	71.9
8	FD 81-1	78.4	81.3	55.1	71.6
9	FD 73-44	77.6	85.7	50.1	71.1
10	N-2005-1	76.0	86.0	38.1	66.7
11	SH-1035	71.3	86.0	42.3	66.5
12	N-2005-4	75.0	84.0	34.5	64.5
13	Sante	78.0	71.7	40.4	63.4
14	SH-718	78.6	81.0	29.7	63.1
15	FD 73-75	74.3	80.3	33.5	62.7
16	FD 78-36	68.4	83.3	36.1	62.6
LSD 5%		4.603	5.200	10.522	

Data presented in Table No. 13 shows that medium size tubers %age (35-55mm) remained low at NARC, Islamabad as compared to the other locations. On an average basis maximum medium size tuber percentage (**76.8%**) was recorded in a strain FD 76-12 followed by FD 77-4 which gave 76.3% medium size tuber percentage and minimum (**62.6 %**) was recorded in a strain FD 78-36. On individual basis, the highest medium size tuber percentage (88.3%) was recorded from the strain FD 73-110 at VRI, Faisalabad whereas minimum (29.7%) was recorded from the strain SH-718 at NARC, Islamabad.

Table No. 14. Large size tuber (>55mm) of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	FD 76-12	8.3	6.3	7.8	7.5
2	FD 77-4	8.7	5.0	8.1	7.3
3	FD 76-67	6.7	3.0	10.6	6.8
4	FD 73-49	5.0	6.3	4.9	5.4
5	FD 73-44	5.7	5.3	4.2	5.1
6	Kuroda	4.7	0.7	7.1	4.2
7	N-2005-1	4.7	2.0	5.0	3.9
8	FD 76-59	8.0	1.0	2.7	3.9
9	FD 81-1	4.3	2.0	3.5	3.3
10	FD 73-110	5.3	0.7	4.0	3.3
11	SH-1035	4.7	0.0	4.7	3.1
12	N-2005-4	2.7	1.0	3.4	2.4
13	Sante	3.3	0.0	2.9	2.1
14	FD 78-36	3.3	0.7	1.6	1.9
15	SH-718	1.7	2.3	1.2	1.7
16	FD 73-75	3.0	1.0	1.2	1.7
LSD 5%		2.121	1.000	2.629	

The data presented in Table No. 14 shows that on an average basis, maximum large size tuber percentage (7.5%) was produced by the strain FD 76-12 followed by FD 77-4 (7.3%) and minimum (1.7%) was recorded for the strain FD 73-75. The local strain SH-1035 and commercial check variety Sante did not produce any ration size tuber at Faisalabad location.

Table No. 15. Scab %age of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	N-2005-1	0.3	0.7	0.0	0.3
2	Kuroda	0.3	0.7	1.0	0.7
3	FD 73-75	3.0	0.3	0.0	1.1
4	FD 77-4	4.7	0.0	0.0	1.6
5	FD 78-36	3.7	0.0	1.0	1.6

6	N-2005-4	2.3	2.3	1.0	1.9
7	FD 73-110	4.7	1.0	0.0	1.9
8	FD 81-1	4.0	1.7	1.0	2.2
9	FD 73-49	6.3	2.3	0.0	2.9
10	SH-1035	7.3	0.7	1.0	3.0
11	Sante	4.0	1.3	4.0	3.1
12	FD 73-44	7.7	2.3	0.0	3.3
13	FD 76-59	8.0	2.3	0.0	3.4
14	SH-718	15.0	0.3	0.0	5.1
15	FD 76-67	20.0	4.0	4.0	9.3
16	FD 76-12	24.3	4.3	1.0	9.9
LSD 5%		5.075	1.000	0.417	

It was observed from the Table No. 15 that on an average basis, the minimum attack of scab was recorded on the strain N-2005-1 (0.3%) followed by commercial check variety Kuroda (0.7%), whereas the maximum incidence (9.9%) was shown by the strain FD 76-12 against scab. Location wise, maximum incidence percentage for scab was observed at PRI, Sahiwal as compared to other locations.

Table No. 16. Rhizoctonia %age of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	N-2005-1	0.0	1.0	0.0	0.3
2	SH-718	0.0	2.0	0.0	0.7
3	FD 76-59	0.3	3.7	0.0	1.3
4	FD 73-75	2.7	3.0	0.0	1.9
5	FD 77-4	5.0	3.7	0.0	2.9
6	FD 76-12	2.0	6.7	1.0	3.2
7	FD 73-49	7.7	2.3	0.0	3.3
8	FD 81-1	7.3	5.0	1.0	4.4
9	SH-1035	12.3	4.7	0.0	5.7
10	N-2005-4	18.3	2.3	1.0	7.2
11	FD 73-44	15.7	7.3	0.0	7.7
12	FD 76-67	20.7	5.0	0.0	8.6
13	FD 78-36	18.3	8.0	1.0	9.1

14	Sante	13.0	12.3	4.3	9.9
15	FD 73-110	85.3	2.0	0.0	29.1
16	Kuroda	87.7	4.0	1.0	30.9
LSD 5%		5.864	2.100	0.637	

The data presented in Table No. 16 shows that the incidence of Rhizoctonia varied among varieties. Some varieties/strains showed more incidence whereas some varieties/strains showed less incidence. The strains / varieties showed more incidence at PRI, Sahiwal whereas less incidence at NARC, Islamabad location as compared to other locations. On an average basis the minimum Rhizoctonia incidence was observed on the strain N-2005-1 (**0.3%**) followed by SH-718 (0.7%) where as the maximum rhizoctonia incidence (**30.9%**) was observed on the commercial check variety Kuroda. On individual basis, the commercial check variety Kuroda showed highest rhizoctonia incidence at PRI, Sahiwal location.

Table No. 17. Cracking %age of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	Sante	0.0	0.0	0.0	0.0
2	FD 81-1	0.0	0.0	0.0	0.0
3	N-2005-1	0.0	0.0	0.0	0.0
4	FD 76-59	0.0	0.0	0.0	0.0
5	SH-1035	0.0	0.0	0.0	0.0
6	FD 78-36	0.0	0.0	0.0	0.0
7	SH-718	0.3	0.0	0.0	0.1
8	FD 73-49	0.3	0.0	0.0	0.1
9	FD 73-75	0.3	0.0	0.0	0.1
10	N-2005-4	0.7	0.0	0.0	0.2
11	FD 76-67	0.0	0.0	1.0	0.3
12	FD 77-4	1.3	0.0	0.0	0.4
13	FD 76-12	1.3	0.0	0.0	0.4
14	Kuroda	1.3	0.0	0.0	0.4
15	FD 73-44	1.3	0.0	0.0	0.4
16	FD 73-110	3.7	0.0	0.0	1.2
LSD 5%		1.000	NS	NS	

The data presented in Table No. 17 shows that much less tuber cracking was observed in all locations. On an average basis the strains / varieties namely Sante, FD 81-1, N-2005-1, FD 76-59, SH-1035 & FD 78-36 did not show tuber cracking at all whereas the maximum tuber cracking (1.2%) was observed from the strain FD 73-110.

Table No. 18. Tuber yield (t/ha) of varieties/strains at different locations

Rank	Variety	PRI Sahiwal	VRI, Fsd	NARC, Islamabad	Average
1	FD 73-49	42.6	27.6	36.5	35.6
2	FD 73-44	39.8	31.1	30.6	33.8
3	FD 81-1	37.4	28.3	32.4	32.7
4	SH-1035	41.5	28.2	28.3	32.7
5	FD 77-4	35.4	26.3	29.2	30.3
6	FD 76-59	40.0	23.9	25.9	29.9
7	FD 76-67	37.2	23.7	27.5	29.5
8	FD 73-110	37.4	20.4	28.9	28.9
9	FD 78-36	35.4	21.1	29.6	28.7
10	FD 76-12	28.5	26.9	29.7	28.4
11	FD 73-75	31.5	28.2	23.8	27.8
12	SH-718	31.1	18.5	28.3	26.0
13	Kuroda	30.3	14.3	26.9	23.8
14	Sante	25.9	13.0	25.5	21.5
15	N-2005-1	16.1	18.3	29.2	21.2
16	N-2005-4	13.1	5.2	28.2	15.5
LSD 5%		3.877	8.900	6.626	

The data presented in Table No. 18 shows that on an average basis the strain FD 73-49 produced the maximum tuber yield (**35.6 t/ha**) followed by FD 73-44 (**33.8 t/ha**). **12** strains showed higher yield than both the standard varieties Kuroda & Sante. Minimum tuber yield (**15.5 t/ha**) was recorded in the strain N-2005-4. On individual location basis, the highest tuber yield was obtained from Potato Research Institute, Sahiwal location. On an individual basis, maximum tuber yield (**42.6 t/ha**) was obtained from the strain FD 73-49 at PRI, Sahiwal location whereas

minimum tuber yield (**5.2 t/ha**) was obtained from strain N-2005-4 at Vegetable Research Institute, Faisalabad location.

9. Adaptability Trial of Exotic Potato Varieties.

27 exotic varieties imported by eight different seed companies were tested along with standard varieties / local checks in adaptability trials at Potato Research Institute (PRI) Sahiwal. Out of these, **21 and 18** exotic varieties were also planted at Potato Research Station, Sahowali (Sialkot) and Vegetable Research Institute, Faisalabad respectively. The trial planted at Potato Research Station, Sahowali, (Sialkot) was completely destroyed due to the heavy rains at the time of harvesting. Data could only be recorded from two locations i.e. Potato Research Institute, Sahiwal & Vegetable Research Institute, Faisalabad.

Seed potatoes of these varieties were received at PRI, Sahiwal and VRI, Faisalabad during autumn crop season at different dates. These varieties were tested in randomized complete block design with three replications and 6.0m x 2.25m a plot size at both at locations keeping plant to plant and row to row distances of 20 cm and 75 cm, respectively. The planting and harvesting were done on the date mentioned in each table. Standard agronomic and plant protection practices were followed to raise the crop. The results obtained and the data recorded on these potato varieties at Potato Research Institute Sahiwal and Potato Research Station, Sahowali (Sialkot) are given below. Data regarding emergence, tuber grades, tube diseases and yield were recorded. The results are presented in the Tables No. 19-22.

Table No.19. Performance of potato strains/varieties in an adaptability trial at Potato Research Institute, Sahiwal (Set-I)

Rank	Variety	Company Name	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
				<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	171	Bari Traders	89.3	15.0	82.0	3.0	0.3	2.0	0.3	27.9
2	Compass	Bari Traders	84.4	20.0	76.3	3.7	0.7	4.3	0.0	24.5
3	Masai	Trade Channels	97.1	14.0	84.7	1.3	4.0	23.0	0.0	23.0
4	Red Sun	M.A. Sons	99.6	12.7	85.0	2.3	0.0	0.3	0.0	23.0
5	Rock	Bhatti Brothers	97.4	22.0	76.3	1.7	0.0	2.7	0.0	22.9
6	Melanto	Hunza Seed Corporation	93.4	12.3	81.4	6.3	0.0	2.3	0.0	21.5
7	Red Valentine	M.A. Sons	98.9	28.0	71.3	0.7	0.0	1.3	0.0	21.0
8	Amarin	Hunza Seed Corporation	97.4	16.3	81.4	2.3	0.0	44.3	0.0	20.9

9	Dirosso	Hunza Seed Corporation	97.4	15.3	84.7	0.0	0.0	10.3	0.0	20.8
10	Simply Red	Commercial Check	98.9	20.3	78.0	1.7	2.0	6.3	0.3	17.9
11	Triplo	Hunza Seed Corporation	89.6	24.3	75.7	0.0	0.0	7.3	0.0	17.5
12	Toscana	Trade Channels	95.2	31.3	68.7	0.0	1.0	38.0	0.7	17.2
13	Sante	Commercial Check	99.3	27.7	72.3	0.0	1.7	28.3	0.0	15.9
14	Ludmilla	Trade Channels	90.7	40.7	59.0	0.3	1.3	60.0	0.3	15.6
15	Lady Sara	Bhatti Brothers	96.7	18.7	80.6	0.7	0.0	0.0	0.0	13.8
16	Vendula	ICI Pakistan	83.0	51.7	48.3	0.0	0.0	3.3	0.0	12.4
17	Bohemia	ICI Pakistan	97.1	36.3	63.7	0.0	0.0	9.0	0.0	12.1
18	Zina Red	Hunza Seed Corporation	35.9	26.7	73.3	0.0	0.0	8.3	0.0	11.8
19	Jannet	ICI Pakistan	90.4	15.7	83.3	1.0	1.3	10.7	0.3	9.4
20	Camel	Afzal International	79.6	92.3	7.7	0.0	0.0	60.0	0.0	4.1
21	Terka	ICI Pakistan	96.7	90.0	10.0	0.0	0.0	1.7	0.7	3.2
22	Red Anna	ICI Pakistan	86.3	19.7	80.3	0.0	0.7	2.3	0.0	3.0
23	Jitka	ICI Pakistan	88.9	93.0	7.0	0.0	0.0	6.3	0.0	2.1
24	KWS-06-125	Afzal International	82.2	91.0	9.0	0.0	0.3	52.3	0.0	1.1
LSD 5%			6.386	8.706	8.503	1.715	1.356	7.740	0.531	3.626
<i>Date of planting</i>						= 10.11.2014				
<i>Date of harvesting</i>						= 06.04.2015				

The exotic variety 171 gave the maximum yield (**27.9** t/ha) followed by Compass which yielded **24.5** t/ha. Nine varieties gave higher yield than the best standard variety Simply Red. Out of these nine varieties, five varieties gave significantly higher yield than the best standard variety Simply Red. The lowest yield was produced by the exotic variety KWS-06-125 (**1.1** t/ha). The highest emergence (**99.6%**) was shown by the exotic variety Red Sun. The lowest emergence was shown by the variety Zina Red (35.9 %). Tuber grades have more importance for commercial use. While persuing the tuber grade data, it was observed that the variety Melanto produced maximum ration size tubers i.e. **6.3%**. Maximum percentage (**93%**) of small size tubers was recorded for the exotic variety Jitka. Regarding disease infection, it was observed that all varieties showed less attack of tuber diseases however the attack of rhizoctonia was more as compare to other tuber diseases. Maximum scab infestation (**4.0%**) was recorded on exotic variety Masai. Whereas 14 varieties showed complete tolerance against scab. Maximum rhizoctonia attack was observed on exotic varieties Ludmilla & Camel (**60%**). Maximum tuber cracking (**0.7%**) was recorded in exotic varieties Toscana & Terka.

Table No.20. Performance of potato strains/varieties in an adaptability trial at Vegetable Research Institute, Faisalabad (Set-I)

Rank	Variety	Company Name	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
				<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	Red Sun	M.A. Sons	99.3	10.3	87.0	2.7	2.7	2.7	0.0	35.2
2	Red Valentine	M.A. Sons	99.6	16.0	80.7	3.3	2.0	2.7	0.3	34.1
3	Rock	Bhatti Brothers	95.6	12.7	84.3	3.0	2.3	3.3	0.0	28.4
4	Vendula	ICI Pakistan	93.3	12.7	85.3	2.0	1.7	1.3	0.0	25.6
5	Jannet	ICI Pakistan	93.0	12.0	84.7	3.3	2.3	3.0	0.0	24.8
6	Bohemia	ICI Pakistan	93.0	14.6	83.7	1.7	0.7	1.7	0.0	24.6
7	Simply Red	Commercial Check	88.2	14.0	84.0	2.0	1.3	1.3	0.0	23.7
8	Ludmilla	Trade Channels	90.4	20.0	80.0	0.0	1.0	2.3	0.0	23.3
9	Camel	Afzal International	91.5	15.7	82.0	2.3	1.0	1.7	0.0	22.2
10	Lady Sara	Bhatti Brothers	85.6	13.7	83.3	3.0	0.7	2.0	0.0	19.1
11	Sante	Commercial Check	83.0	22.0	77.7	0.3	2.7	4.7	0.0	17.0
12	Red Anna	ICI Pakistan	84.1	11.3	87.7	1.0	2.0	2.0	0.3	14.7
13	Jitka	ICI Pakistan	80.0	30.0	70.0	0.0	0.7	2.3	0.0	13.0
14	Terka	ICI Pakistan	76.7	30.3	69.0	0.7	2.3	3.3	0.7	12.6
15	KWS-06-125	Afzal International	80.7	12.0	85.3	2.7	2.3	2.7	0.3	9.8
LSD 5%			7.6	5.7	5.3	1.9	1.7	1.2	0.9	4.9
			<i>Date of planting = 14.11.2014</i>							
			<i>Date of harvesting = 02.04.2015</i>							

Study of the Table reveals that the variety Red Sun gave maximum yield (35.2 t/ha) followed by Red Valentine with yield value of 34.1t/ha. The lowest yield (9.8 t/ha) was recorded in variety KWS-06-125. Highest emergence (99.6%) was recorded from the exotic variety Red Valentine. While persuing the tuber grades, it was observed that the maximum ration size tuber percentage was recorded in the exotic varieties Red Valentine & Jannet (3.3%) while maximum small size tuber percentage was recorded in the exotic variety Terka (30.3%). Regarding disease infection, it was observed that all varieties showed less attack of tuber diseases, however maximum scab infestation (2.7%) was observed in check variety Sante and Red Sun whereas minimum infestation (0.7%) was recorded on varieties Bohemia and Lady Sara. Variety Sante showed maximum attack of rhizoctonia (4.7%). Minimum percentage (1.3%) was recorded on variety Vendula. Tuber cracking was not a serious threat in this trial anyhow it was noticed in varieties Terka, Red Anna, KWS 06-125 and Red Valentine.

Table No.21. Performance of potato strains/varieties in an adaptability trial at Potato Research Institute, Sahiwal (Set-II).

Rank	Variety	Company Name	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
				<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	Simply Red	Commercial Check	97.8	21.0	73.0	6.0	0.0	0.0	0.0	27.4
2	El Mundo	Afzal International	94.8	47.7	52.3	0.0	0.0	0.0	1.0	17.0
3	Sante	Commercial Check	96.7	28.3	70.4	1.3	3.0	38.7	0.0	16.9
4	Red Sonia	Punjab Agri. Farms	94.5	75.7	24.3	0.0	0.0	0.0	0.0	7.0
5	Georgina	Punjab Agri. Farms	90.0	88.3	11.7	0.0	0.0	0.7	0.0	6.8
6	Coronada	Punjab Agri. Farms	94.1	47.3	52.7	0.0	1.7	0.0	1.7	6.7
7	Cumbica	Punjab Agri. Farms	81.9	83.3	16.7	0.0	0.0	0.0	0.0	3.6
LSD 5%			5.694	11.345	10.496	2.393	1.165	4.299	1.452	2.960
				<i>Date of planting = 24.11.2014</i>						
				<i>Date of harvesting = 16.04.2015</i>						

Keeping in view the above data, it was observed that none of the exotic variety gave higher yield than the best standard variety Simply Red. The highest yield was given by the commercial check variety Simply Red (**27.4 t/ha**) followed by the exotic variety El Mundo which yielded 17.0 t/ha. Although the yield of El Mundo is higher than the standard variety Sante but not significantly higher. The exotic variety Cumbica produced the lowest tuber yield (**3.6 t/ha**). The highest emergence (**97.8%**) was shown by the standard variety Simply Red. While persuing the tuber grade data, it was observed that the commercial check variety Simply Red produced maximum ration size tubers i.e. **6.0%**. Maximum percentage (**88.3%**) of small size tubers was recorded for the exotic variety Georgina. Regarding disease infection, it was observed that much less attack of all tuber diseases was noticed on all varieties. Maximum scab infestation (**3.0%**) was recorded on standard variety Sante whereas the five varieties showed tolerance against scab. Maximum rhizoctonia attack was observed on standard variety Sante (**38.7%**) whereas five varieties did not show any attack of rhizoctonia. Maximum tuber cracking (**1.7%**) was recorded in exotic variety Coronada whereas five varieties showed complete tolerance against tuber cracking.

Table No.22. Performance of potato strains/varieties in an adaptability trial at Vegetable Research Institute, Faisalabad (Set-II).

Rank	Variety	Company Name	Emer (%)	Tuber Grade (%)			Tuber Diseases (%)			Yield (t/ha)
				<35 mm	35-55 mm	>55 mm	Scab	Rhiz	Crack	
1	El Mundo	Afzal International	97.5	17.5	81.8	0.7	0.0	0.0	0.0	27.2
2	Red Sonia	Punjab Agri. Farms	93.6	12.0	86.3	1.7	0.0	0.0	0.0	22.6
3	Coronada	Punjab Agri. Farms	91.4	13.0	86.0	1.0	0.0	0.0	0.0	20.9
4	Cumbica	Punjab Agri. Farms	91.4	13.0	84.8	2.2	0.0	0.0	0.0	20.6
5	Georgina	Punjab Agri. Farms	91.1	14.0	85.5	0.5	0.0	0.0	0.0	19.4
LSD 5%			4.2	5.2	4.6	1.2	NS	NS	NS	2.9
				<i>Date of planting</i> = 26.11.2014						
				<i>Date of harvesting</i> = 02.04.2015						

Study of the table reveals that the variety El-mundo produced maximum tuber yield (27.2 t/ha) followed by Red Sonia with yield value of 22.6 t/ha. The lowest yield (19.4 t/ha) was recorded in variety Georgina. The highest emergence (97.5%) was observed in the exotic variety El Mundo. Maximum ration size tubers (2.2%) were produced by the exotic variety Cumbica, whereas the maximum small size tubers (17.5%) were produced by the exotic variety El Mundo. Regarding tuber diseases it was observed that none of the disease was observed on the tubers at harvesting. The yield could be increased if the trial was planted well in time but this trial was planted very late as compared to normal planting time. Secondly the tubers were dormant at planting time and emerged out very late.

10. Screening of different advanced potato strains against late blight disease

A total of **10** advanced strains/ varieties of potato were evaluated for resistant / tolerant against late blight disease at Summer Agricultural Research Station, Kaghan. The material was sown on **26.06.2014**, keeping plant to plant and row to row distances as 20 cm and 75 cm, respectively. The plot size was 6.0 mx 1.5 m. The trial was conducted according to the randomized complete block design (RCBD) with three replications. Normal agronomic and plant protection (only against insects) measures were carried out in the crop. The trial was harvested on **11-10-2014**. Data regarding late blight incidence percentage were recorded and presented in the form of tolerance against late blight in the below Table.

Table No.23. Performance of potato strains/varieties against late blight at SARS, Kaghan

Rank	Variety	Late blight tolerance (%)	Significant
1	FD 73-75	89.0	A
2	FD 77-4	89.0	A
3	FD 78-15	89.0	A
4	FD 76-59	85.3	A
5	FD 63-1	81.7	A
6	FD 74-38	44.3	B
7	SH-5	40.3	B
8	FD 73-49	29.3	C
9	FD 75-6	11.0	D
10	Saghitta	0.0	E

The symptoms of the disease were visually observed. Three strains i.e. FD 73-75, FD 77-4 & FD 78-15 showed maximum tolerance (89.0% of each) against late blight followed by FD 76-59 which depicted 85.3% tolerance. The commercial check variety Saghitta showed no tolerance against late blight and all the plants of the variety were found dead.

B. Potato Research Station, Sahowali (Sialkot)

Potato Research Station, Sahowali, Sialkot comprises of two Sub-stations i.e. one at Murree and one at Faisalabad. Initially, it was established in 1964 as Potato Research Station, Sialkot after shifting of its Headquarters from Murree to Sialkot. An area of 50.44 acres was allotted for research purposes. During the course 1964 to 2012, all the area (50.44) acres was transferred to various other Departments by the Government in public interest and no agricultural land was left for carrying out research experiments on Potato crop. In the year 2012 an area of 9.9 acres was allotted to this Station for conducting research experiments on Potato at Pulses Research Station, Sahowali, Pasrur Road distt. Sialkot and the Potato Research Station was shifted to Sahowali, Sialkot. The Primary objectives of this Station are to develop new and improved varieties of Potato which are high yielding, tolerant to frost and diseases and possess good tuber quality characteristics with wider adaptability to different agro ecological zones compared to the existing varieties in order to enhance Potato production in the province as well as in the country through introduction, selection, hybridization and improved crop growing techniques.

Table No. 24. Station wise detail of area

Sr.#	Name of Station	Total Area (Acres)	Cultivated Area (Acres)	Area under Road & Buildings (Acres)	Other than Area		
					Pattadar Area	Area under encroachment	Un Commended Area
1	Potato Research Station Sahowali, Sialkot	11.1	9.9	1.2	-	-	-
2	Potato Breeding Research Station, Murree	4.5	3.0	1.5	-	-	-
3	Potato Research Sub- Station, Faisalabad	-	-	-	-	-	-
	TOTAL	15.6	12.9	2.7	-	-	-

Table No. 25. Manpower

Sr.#	Name of Station	Scientific		Supporting		Ministerial	
		Total		Total		Total	
1	Potato Research Station Sahowali, Sialkot	Total	05	Total	17	Total	08
		Filled	03	Filled	12	Filled	05
		Vacant	02	Vacant	05	Vacant	03
2	Potato Breeding Research Station, Murree	Total	01	Total	06	Total	-
		Filled	01	Filled	02	Filled	-
		Vacant	0	Vacant	04	Vacant	-
3	Potato Research Sub- Station, Faisalabad	Total	03	Total	05	Total	02
		Filled	0	Filled	03	Filled	01
		Vacant	03	Vacant	02	Vacant	01

The main fields of study/ research work with this station are as under:-

1. Hybridization is carried out for the creation of variability in the existing local as well as exotic varieties of Potato at Potato Breeding Research Sub-Station, Murree where flowering in Potato varieties takes place during July-August. The conditions are conducive for getting viable seed after crossing. Botanical seed in raised is nursery beds. Keen observations are taken from sowing to harvesting, like growth, leaf, stem characters, foliar, tuber diseases and tuber characters. The promising plants are selected for multiplication and further studies at Potato Research Station, Sahowali, Sialkot.
2. Introduction of exotic high yielding, disease tolerant, frost tolerant varieties having good quality and other desirable characters.
3. Standardization of packages of crop production technology for new elite strains and low cost production techniques.
4. Pathological studies are carried out for control of Fungal, viral and other tuber diseases.
5. Quality evaluation is carried out at Potato Research Sub-Station, Faisalabad.

All the experiments were sown at proper time according to the annual programme of research work covering important aspects of Potato crop at Potato Breeding Research Sub-station, Murree during summer 2014 for attempting new crosses and screening of Nursery. During Autumn 2014-15, experiments were sown at Potato Research Station, Sialkot under normal crop growing conditions. The seed potato tubers were planted with plant to plant distance of 20cm and row to row distance of 75cm followed by ridging. To control Weeds, suitable weedicides were sprayed upon the crop at proper time. For the control of insect pests, fungal and other Potato diseases, the crop was sprayed with recommended doses of suitable insecticides and fungicides at regular intervals. The irrigation was applied as and when needed. Utmost efforts were made to give equal management to all the trials to keep the experimental error at minimum level.

WEATHER AND ITS EFFECTS

The meteorological parameters viz. Maximum, Minimum, Temperature, High velocity winds, Hail storm, Frost, Mist, Cloudy days and Rainfall recorded at Sahowali, Sialkot from 01-07-2014 to 30-06-2015 are given in Table No.26 below.

Table No. 26. Meteorological data recorded at potato research station, sahowali, sialkot during the year, 2014-2015

Sr. No.	Month	Max. Temp. (Mean) C°	Min. Temp. (Mean) C°	No. of Frosty Days	Mist (Days)	High velocity wind (Days)	Hail-storm (Days)	No. of Cloudy days	Rain-fall mm
1	July,2014	39.0	26.0	-	-	-	-	12	88.9
2	Aug.,2014	35.6	22.5	-	-	-	-	17	32.0
3	Sept.,2014	32.9	22.8	-	-	-	-	15	539.0
4	Oct.,2014	30.5	18.0	-	-	-	-	10	7.0
5	Nov.,2014	25.6	08.4	-	4	-	-	05	Nil
6	Dec.,2014	20.7	04.3	5	18	-	-	06	Nil
7	Jan.,2015	18.0	05.5	4	18	-	-	12	9.5
8	Feb.,2015	22.0	08.5	-	10	1	1	16	103.0
9	March,2015	25.4	10.9	-	-	-	-	21	304.0
10	April,2015	31.3	18.1	-	-	2	-	16	95.5
11	May,2015	39.1	22.2	-	-	4	-	06	3.0
12	June,2015	37.8	22.8	-	-	8	-	21	78.0
Total:-				9	50	15	1	157	1259.9

Extra ordinary excessive monsoon rains during the month of September, 2014 up to the extent of 539.00 mm and flooding of rain water from adjoining areas resulted in standing of abundant amounts of rain water in the fields. A total of 659.9 mm of rainfall was received during the months of July, August and September, 2014, which is much higher than the normal monsoon rains. Rain water kept standing in the fields till the end of the month of September, 2014. Kharif fodder crops for generating farm income could not be sown due to standing rain water resulting in the reduction of total income of the farm..

Land preparation for sowing of Rabi crops of Potato and Berseem for 2014-15 was delayed due to standing rain and flood water in fields. When the fields dried, Potato crop and experiments were sown. Berseem crop was also sown as fodder crop for generating income. Potato crop and experiments germinated very well and plant stand was good at initial stage. Weedicides were sprayed upon the Potato crop to check the growth of weeds. Attack of blight was also noted on the crop but it was adequately controlled by spraying fungicides on the Potato crop at regular intervals. The Potato crop and experiments were growing well and tuber formation was also very good but just before maturity, extra ordinary excessive winter rains during the months February and March, 2015 resulted in the standing of large amounts of rain water in the fields preventing harvesting of most of the Potato crop. A total of 103.0 mm rainfall during February, 2015, 309.0 mm rainfall during March, 2015 and 72.0 mm of rainfall was received in the first week of April, 2015. A comparison of rainfall received during the months of February and March of past three years is given in the table below in Table No. 27:-

Table No. 27. Comparison of rainfall from 2012 to 2015 at the time of harvesting

Sr. No.	Year	Month	Rainfall (mm)
1	2012	February	50.80
		March	3.81
		Total	54.61
2	2013	February	173.48
		March	6.35
		Total	179.83
3	2014	February	8.89
		March	140.97
		Total	149.86
4	2015	February	103.0
		March	309.0
		Total	412.0

It is evident from the above table that extra-ordinary excessive amount of rainfall occurred during the current year in the months of February and March compared to previous years. Rain water also accumulated in the fields from adjoining areas. Excessive water could not be drained elsewhere due to obstruction of the boundary wall of Divisional Public School. Only a few experiments and some of the Potato crop could be harvested. A total of 1259.90 mm. of rainfall was recorded at the Station during the year under report. Most of the mature Potato crop remained inundated in rain water. High humidity and water in the fields favoured severe attack of Late blight of Potato which appeared in epidemic form. Potato tubers were rotten in continuously standing water and blight. Most of the precious Breeding material was also rotten and destroyed. Nearly 60 to 70 percent of the Potato crop was rotten and destroyed completely which drastically reduced the final yield of Potato crop. Condition of Berseem crop sown for fodder purposes remained satisfactory at initial stage. The crop was auctioned as fodder but its last cuttings were destroyed by continuously standing water resulting in the reduction of fodder yield.

RESEARCH WORK PERFORMED

1. Preliminary evaluation of crossed material during autumn, 2014-2015

Study of progenies of crosses made during 2011

A total of 30 progenies were raised and studied according to augmented design with a plot size of 6.0 m X 0.75 meter. Planting was done on 22-10-2014 and harvesting on 16-2-2015. Out of 30 progenies, 26 promising were selected on overall basis as given below in Table No. 28

Table No.28. Number of progenies raised and selected during 2014-15

Progenies planted	Progenies selected
SH-1635, SH-1636, SH-1637, SH-1638,	SH-1635, SH-1637, SH-1638, SH-1640,
SH-1640, SH-1641, SH-1642, SH-1643,	SH-1641, SH-1642, SH-1643, SH-1644,
SH-1644, SH-1645, SH-1646, SH-1647,	SH-1645, SH-1646, SH-1647, SH-1648,
SH-1648, SH-1649, SH-1651, SH-1652,	SH-1649, SH-1651, SH-1652, SH-1653,
SH-1653, SH-1654, SH-1655, SH-1656,	SH-1654, SH-1655, SH-1656, SH-1657,
SH-1657, SH-1658, SH-1660, SH-1661,	SH-1661, SH-1662, SH-1663, SH-1664,
SH-1662, SH-1663, SH-1664, SH-1665,	SH-1665, SH-1666,
SH-1666, SH-1668,	

Study of progenies of crosses made during 2012

A total of 50 progenies received from Potato Breeding Research Sub-station, Murree were sown on 4-12-2014 according to augmented design with a plot size of 6.0 m X 0.75 m meter as given in the table No. 29 below to study their performance at Sahowali, Sialkot and further selection. All the entries were destroyed by rotting in continuously standing rain water, hence no entry could be selected for further study.

Table No.29. Number of progenies raised and selected during 2014-15

Progenies planted	Progenies selected
SH-1671, SH-1672, SH-1673, SH-1674, SH-1675, SH-1676, SH-1677, SH-1678, SH-1679, SH-1680, SH-1681, SH-1682, SH-1683, SH-1684, SH-1685, SH-1686, SH-1687, SH-1688, SH-1689, SH-1690, SH-1691, SH-1692, SH-1693, SH-1694, SH-1695, SH-1696, SH-1697, SH-1698, SH-1699, SH-1700, SH-1701, SH-1702, SH-1703, SH-1704, SH-1705, SH-1706, SH-1707, SH-1708, SH-1709, SH-1710, SH-1711, SH-1712, SH-1713, SH-1714, SH-1715, SH-1716, SH-1717, SH-1718, SH-1719, SH-1720	All the entries were rotten in continuously standing rain water and were completely destroyed.

2. Secondary evaluation of twenty three red and white potato strains/ varieties for their yield potential and other desirable traits during 2014-15

The trial was planted on 21-10-2014 according to Randomized Complete Block design with three replications, keeping plot size of 6.0 m x 1.5 m for selecting new promising varieties/ strains. This trial was harvested on 10-3-2015. Data on emergence percentage, tuber grades, tuber diseases and tuber yield were recorded and are presented in Table No.30 below:

Table No. 30. Performance of strains/varieties in a secondary trial.

Rank	Variety	Emergence (%)	Tuber Grade (%)			Tuber Disease (%)			Yield (t/h)
			>55 mm	35-55 mm	<35 mm	Scab	Rhiz.	Crack	
1	SH-1076	94.33	10.00	81.67	8.33	5.67	1.67	8.33	11.10
2	SH-1109	98.67	19.67	67.00	13.33	4.67	3.00	1.67	20.73
3	SH-1148	99.33	8.33	74.67	17.00	4.67	1.33	3.67	8.90
4	SH-1150	100.00	11.33	68.67	16.67	7.33	2.33	1.00	13.70

5	SH-1154	99.67	12.67	73.33	14.00	8.67	2.33	3.67	12.93
6	SH-1155	99.67	15.00	68.00	17.00	11.33	6.33	1.67	20.37
7	SH-1181	100.00	14.00	66.67	19.33	6.00	2.00	0.00	21.10
8	SH-1191	100.00	11.33	70.00	18.67	5.33	1.67	0.00	21.10
9	SH-1195	99.67	11.67	70.00	18.33	4.33	2.33	2.33	27.80
10	SH-1196	100.00	11.00	65.33	23.67	6.33	1.67	2.33	23.70
11	SH-1200	100.00	9.00	72.00	19.00	6.33	4.33	0.33	21.10
12	SH-1206	98.67	12.33	69.67	18.00	9.33	12.33	1.00	18.53
13	SH-1207	99.00	11.33	73.33	15.33	7.33	3.33	4.33	15.93
14	SH-1208	99.33	20.00	68.67	10.67	2.33	2.33	4.00	21.83
15	SH-1212	99.33	15.67	69.67	14.67	7.33	3.67	1.00	18.17
16	SH-1205	100.00	7.33	83.33	9.33	5.33	2.67	0.00	21.10
17	SH-1213	100.00	21.33	69.00	9.67	3.33	1.67	0.67	25.20
18	SH 1233	99.67	16.33	73.33	10.33	3.67	1.67	0.00	15.57
19	SH-1259	99.33	16.33	74.33	9.33	6.67	3.67	3.00	17.03
20	SH-1270	100.00	10.67	69.00	20.33	5.67	2.00	0.00	16.67
21	SH-1276	99.67	11.00	74.67	14.33	7.33	4.00	2.00	13.70
22	SH 5	99.67	24.00	65.00	11.00	4.67	4.00	5.00	18.17
23	Diamant	99.67	15.00	70.67	14.33	14.67	36.33	1.67	17.07
LSD at 0.05 level		1.22	2.89	4.30	2.96	2.48	2.82	1.70	2.75

The variety SH-1195 showed the best yield of 27.80 tons/hectare followed by the varieties SH-1213 and SH-1196 with a yield of 25.20 and 23.70 tons per hectare respectively. Differences in yield between the top two varieties were statistically non-significant.. These three varieties along with the varieties SH-1181, SH-1191, SH-1200, SH-1208 and SH-1205 significantly exceeded the check varieties SH-5 and “Diamant” with respect to yield. These varieties were selected for inclusion in further yield trials.

3. Regular varietal yield trials with new strains/varieties of potato 2014-15

Varieties in the experiment were divided into two sets. Set-1 comprised of Eleven varieties while Set-2 comprised of ten varieties as given below table No. 31.

Table No. 31. Regular Varietal Yield Trial at PRS, Sahowali (Sialkot).

Set-1 (11 including checks)	SH-661, SH-718, SH-1294, SH-1035, Kuroda, SH-1067, SH-1191, SH-1195, SH-1196, SH-5 (Check), Cardinal (Check)
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Set-2 (10 including checks)	SH-493, SH-692, SH-729, SH-795, SH-726, SH-1040, SH-1041, SH-1072, SH-5(Check), Sialkot Sufaid (Check)
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Both the Set-1 and Set-2 were planted on 20-10-2014 according to Randomized Complete Block design with three replications for selecting new promising varieties/ strains. The size of plot in Set-1 was kept 6 meter x 3 meter while size of plot in Set-2 was 6 meter x 2.25 meter. Both the experiments germinated very well and their initial growth was satisfactory. Tuber formation was also good but just before maturity due to heavy rains and continuously standing water all the tubers were rotten and destroyed. Hence the data could not be recorded and may be treated as nil.

4. Adaptability Trial of Exotic Potato Varieties

Seed Potato of 25 promising exotic varieties including two local checks received from the DG, FSC & RD, Islamabad through the Directorate of Potato Research Institute, Sahiwal were sown on 4-11-2013 according to R.C.B.D. with three replications keeping plot size of 6.0 m x 2.25 m for their evaluation under Sahowali, Sialkot conditions. All the varieties in the experiment germinated very well and their initial growth was satisfactory. Tuber formation was also good but just before maturity due to heavy rains and continuously standing water all the tubers were rottened and destroyed. Hence the data could not be recorded and may be treated as nil.

5. National Uniform Potato Yield Trial

Potato Coordinator of National Agricultural Research Centre, Islamabad supplied the seed potato of sixteen varieties/promising lines coded as “A to P” through the Directorate of Potato Research Institute, Sahiwal for their evaluation of yield potential, foliar disease, tuber grades and tuber diseases etc. at Sahowali, Sialkot. This experiment was sown on 28-10-2014 according to R.C.B.D. with three replications keeping plot size of 6 x 1.5 m. All the varieties in the experiment germinated very well and their initial growth was satisfactory. Tuber formation was also good but just before maturity due to heavy rains and continuously standing water all the tubers were rotten and destroyed. Hence the data could not be recorded and may be treated as nil.

C. Potato Breeding Research Sub-Station, Murree.

1. Hybridization

A total of 65 crosses were attempted for obtaining crossed berries between different parent Potato varieties/strains during Summer, 2014. Out of 65 crosses, 47 were successful. 236 berries were obtained from 47 cross combinations for nursery raising during Summer, 2015. The detail of crosses is given in the table No. 32

Table No. 32. Cross combinations and berries obtained at Potato breeding Sub-Station, Murree during summer, 2014

Sr. No.	Cross combination			No. of berries
	Female	X	Male	
1	SH 718	X	SH 1040	14
2	SH 718	X	Kuroda	6
3	SH 718	X	SH-5	26
4	SH 718	X	SH-493	13
5	SH 718	X	SH-1041	22
6	SH 718	X	SH-661	7
7	SH 718	X	SH-1072	1
8	SH 718	X	SH-692	7
9	SH 718	X	NUYVT	1
10	SH-1040	X	SH-718	10
11	SH-1040	X	SH-5	5
12	SH-1040	X	NUYVT	1
13	SH-493	X	SH-5	4
14	SH-493	X	SH-1041	3
15	SH-493	X	SH-718	13
16	SH-5	X	SH-493	1
17	SH-5	X	SH-1041	6
18	SH-1041	X	SH-5	7
19	SH-1041	X	SH-718	11
20	FD 63-1	X	SH-1041	1
21	FD 63-1	X	SH-5	1
22	NUYVT	X	SH-1040	3
23	NUYVT	X	SH-718	3
24	NUYVT	X	SH-5	6
25	SH-1067	X	SH-5	2
26	SH-1072	X	SH-5	9
27	SH-661	X	SH-493	2
28	SH-692	X	SH-1041	2
29	SH-692	X	SH-718	1

30	Sialkot Sufaid	X	SH-661	4
31	SH-795	X	SH-5	5
32	Red River	X	SH-1030	2
33	Red Rascal	X	SH-493	2
34	Red Rascal	X	SH-1035	1
35	Kuroda	X	SH-1040	9
36	Sialkot Sufaid	X	SH-1040	2
37	FD 76-18	X	SH-1041	2
38	FD 76-18	X	FD 61-3	1
39	FD 76-18	X	SH-5	5
40	FD 76-18	X	N-9625	2
41	FD 74-21	X	Red River	1
42	FD 75-50	X	SH-5	2
43	FD 74-30	X	FD 63-1	1
44	FD 74-21	X	SH-5	1
45	Saggita	X	SH-5	5
46	FD76-72	X	SH-718	2
47	FD 74-30	X	FD 63-3	1
			Total	236

2. Selection of desirable genotypes from crosses of 2012

50 plants of 19 cross combinations were selected on the basis of their performance. The detail is presented in table No.33.

Table No. 33. Selected crosses at Potato Breeding Sub-Station Murree during summer 2012

Sr. No.	Cross combination	Plant number	No. of Tubers	Allotted Strain Number
1	SH-5 X F3-9	P 7	3	SH-1671
		P 18	1	SH-1672
2	SH-692 X SH-798	P 4	1	SH-1673
		P 13	2	SH-1674
		P 23	2	SH-1675
		P 24	1	SH-1676
4	Sialkot Sufaid X SH-5	P 23	1	SH-1677
		P 24	3	SH-1678
5	SH-114 X SH-5	P 57	8	SH-1679
6	SH-704 X FD 3-9	P 3	5	SH-1680
		P 22	1	SH-1681
7	SH-552 X SH-240	P 20	2	SH-1682
8	SH-1060 X SH-5	P 2	1	SH-1683
		P 7	1	SH-1684
9	SH-1035 X SH-5	P 14	2	SH-1685

		P 25	3	SH-1686
		P 28	2	SH-1687
		P 31	11	SH-1688
		P 43	2	SH-1689
10	SH-798 X SH-493	P 1	6	SH-1690
		P 22	4	SH-1691
		P 31	2	SH-1692
		P 32	2	SH-1693
		P 38	3	SH-1694
		P 42	8	SH-1695
		P 44	1	SH-1696
		P 53	3	SH-1697
11	SH-798 X SH-5	P 2	6	SH-1698
		P 8	12	SH-1699
		P 18	3	SH-1700
		P 27	3	SH-1701
		P 45	3	SH-1702
		P 53	1	SH-1703
12	SH-692 X SH-1067	P 18	11	SH-1704
13	SH-5 X FD 69-1	P 43	4	SH-1705
		P 35	1	SH-1706
		P 42	4	SH-1707
		P 44	3	SH-1708
		P 45	1	SH-1709
14	FD 35-36 X FD 3-9	P 43	2	SH-1710
15	FD 51-5 X SH-5	P 8	1	SH-1711
		P 19	1	SH-1712
		P 36	6	SH-1713
16	N 9625 X FD 35-36	P 11	7	SH-1714
17	Simply Red X FD 3-9	P 3	6	SH-1715
		P 52	1	SH-1716
18	FD 51-5 X FD 1-3	P 4	4	SH-1717
		P 7	2	SH-1718
		P 32	6	SH-1719
19	FD 51-5 X FD 35-36	P 18	3	SH-1720

3. Selection of desirable genotypes from crosses of 2013

57 plants of 9 cross combinations were selected on the basis of their performance. The detail is presented in Table No.34

Table No. 34. Selected crosses at Potato Breeding Sub-Station Murree during summer 2013

Sr. No.	Cross combination	Plant number	No. of Mini tubers	Tuber colour	No. of plants selected
1	SH-718 X SH-5	P 1	4	R	10
		P 4	4	W	
		P 5	2	R	
		P 8	2	R	
		P 9	4	W	
		P 10	2	R	
		P 12	3	W	
		P 16	4	R	
		P 17	5	R	
		P 20	2	R	
2	SH-692 X SH-5	P 1	3	R	4
		P 2	7	R	
		P 5	4	R	
		P 8	3	R	
3	SH-726 X SH-5	P 2	4	R	4
		P 3	5	W	
		P 5	3	R	
		P 10	5	R	
4	SH-795 X SH-5	P 1	6	R	4
		P 2	3	W	
		P 6	5	R	
		P 9	5	R	
5	SH-493 X SH-5	P 1	5	R	2
		P 5	4	R	
6	Sialkot Sufaid X SH-5	P 3	2	R	4
		P 7	2	R	
		P 8	2	R	
		P 10	3	W	
7	VDW 1-69 X FD 78-51	P 1	2	R	9
		P 2	3	W	
		P 3	2	R	
		P 5	2	W	
		P 6	4	R	
		P 9	4	W	
		P 10	2	R	
		P 11	3	R	
P 12	3	W			
8	VDW 1-69 X FD 74-21	P 1	3	W	13

		P 2	2	R	
		P 4	4	W	
		P 5	4	W	
		P 9	5	W	
		P 10	6	W	
		P 11	2	W	
		P 13	3	W	
		P 14	2	R	
		P 17	2	R	
		P 18	3	W	
		P 19	2	W	
		P 20	4	W	
9	FD 78-51 X SH-5	P 1	7	R	7
		P 2	6	R	
		P 3	4	R	
		P 6	6	R	
		P 7	3	R	
		P 8	2	R	
		P 10	3	R	

2. PLANT PATHOLOGICAL STUDIES

Potato Research Station, Sahowali (Sialkot)

1. Evaluation of thirty promising local genotypes for resistance/tolerance against foliar and tuber diseases.

A field experiment comprising thirty potato genotypes was planned to evaluate their resistance/tolerance potential against major foliar and tuber disease. For this purposes, thirty elite varieties/lines were planted on 29-10-2014 along with one check/standard variety viz, cardinal. All the genotypes were planted in 6 meter long single row plots. Normal agronomic practices were carried out and no fungicide was sprayed.

Data on incidence of different parameters, foliar diseases viz, late blight, potato virus(PVX), potato virus Y (PVY), potato leaf roll virus (PLRV) and tuber diseases i.e. common scab, Rhizoctonia and tuber cracking were recorded and is given in Table No.35

Table No. 35. Performance of strains/varieties against foliar and tuber diseases

S.No.	Variety/ Line	Emer %	Blight %	Scab %	Rhz %	Crack %	Rot %	PVX %	PVY %	PLRV %	Yield T/hac.
1	SH-5	100	50	3	4	-	-	-	-	40	30.46
2	SH-493	100	20	5	2	-	-	-	-	10	28.99
3	SH-661	100	10	2	-	-	-	-	-	-	34.04
4	SH-692	100	15	7	1	-	-	-	-	-	31.33
5	SH-701	99	50	30	26	-	-	-	-	-	19.77
6	SH-718	100	10	3	2	-	-	-	-	-	33.55
7	SH-726	100	70	20	37	7	-	-	-	-	23.82
8	SH-729	100	30	14	7	-	-	-	-	10	29.77
9	SH-795	100	50	4	9	3	-	-	-	-	30.95
10	SH-1035	100	10	5	2	-	-	-	-	-	33.02
11	SH-1040	100	20	3	-	-	-	-	-	-	32.06
12	SH-1041	100	40	4	1	-	-	-	-	3	25.13
13	SH-1072	100	30	6	-	-	-	-	-	2	29.08
14	SH-1109	100	80	5	4	-	-	-	-	-	17.79
15	SH-1154	100	20	5	2	-	-	-	-	-	20.26
16	SH-1155	100	20	6	4	-	-	-	-	-	18.11
17	SH-1191	100	30	5	2	-	-	-	-	-	21.06
18	SH-1195	100	10	5	1	-	-	-	-	-	27.08
19	SH-1196	100	30	3	3	-	-	-	-	-	26.24
20	SH-1200	100	70	6	2	-	-	-	-	-	19.97
21	SH-1206	100	40	8	3	-	-	-	-	2	27.97
22	SH-1207	100	50	5	7	1	-	-	-	-	22.93
23	SH-1210	100	40	4	1	-	-	-	-	-	14.24
24	SH-1259	98	30	12	5	-	-	-	-	3	17.09
25	SH-1270	100	50	7	4	-	-	-	-	-	19.13
26	SH-1276	100	40	6	2	-	-	-	-	-	24.91
27	SH-1294	100	30	8	3	-	-	-	-	-	25.57
28	S- Safaid	100	90	14	70	-	-	-	-	-	22.02
29	Cardinal	100	100	18	80	-	-	-	-	-	15.26
30	Diamant	100	100	10	75	-	-	-	-	-	18.91

FOLIAR DISEASES**Early Blight disease.**

The weather proved unfavorable for the onset of the disease, so the disease was observed only in negligible portions.

Late Blight disease incidence.

Among thirty lines/varieties screened against late blight of Potato, none of the line/variety seemed to be free from the disease. Four lines viz. SH-661,SH-718, SH-1035

and 1195 were found with least disease incidence as 10%. Whereas line SH-692, possessed 15% disease incidence. A check variety Cardinal exhibited high level of disease incidence as 100%.

Potato Virus X (PVX).

Among thirty genotypes of Potato sown for screening purposes, all the entries showed no visible symptoms against (PVX).

Potato Virus Y (PVY).

All the lines/varieties expressed resistance and showed no visible symptoms against (PVY).

Potato Leaf Roll Virus (PLRV)

Twenty three lines/varieties remained free from (PLRV) infection and SH-493, SH-729 expressed 10% disease incidence, while SH-1072 and SH-1206 showed only 2% lowest disease incidence. SH-1041 and SH-1259 expressed only 3% disease incidence. Maximum infection level as 40% was recorded on variety SH-5.

TUBER DISEASES

Common Scab disease incidence.

Among thirty Potato germplasm, none of the varieties/ lines was found to be free of the disease. Line SH-661 expressed 1% disease incidence. Two lines/ varieties SH-726 and Cardinal showed 20% and 18% disease incidence respectively. 14% disease incidence was observed on the potato line/variety SH-729, while maximum disease incidence as 30% was recorded on line SH-701.

Black Scurf (*Rhizoctonia sp*) .

1040, 1072 were observed free from the disease. Four lines, SH-662, SH-1041 and SH-1195, and 1210 expressed only 1% disease incidence. Maximum disease incidence 80% was noticed on Cardinal.

Tuber Cracking

Out of thirty genotypes, twenty seven lines/varieties remained free from the disease. Minimum disease incidence as 1% was observed on SH-1207, whereas SH-795 expressed 3% disease incidence. Maximum disease incidence as 7% was recorded on SH-726.

TUBER YIELD

One line viz. SH-661 proved to be the highest yielder with the maximum potato yield of 34.04 t/ha followed by six genotypes as SH-718,SH-1035, SH-1040, SH- 692,SH-795 and SH-5 with their tuber yield of 33.55, 33.02, 32.06, 31.33, 30.95 and 30.46 t/ha respectively. Minimum tuber yield was recorded on a line/ variety Cardinal with a magnitude of 15.24 t/ha given in table No. 35.

2. Control of late blight of potato through different fungicides

An experiment with five different fungicides was planned in order to find out the most efficacious fungicide for the control of late blight disease and highest potato yield. The trial was carried out having RCB design, with three replications and 2.8 m x 6.0 m plot size. Row and plant spacing were maintained as 70 cm and 20 cm respectively. The test variety SH-5 was planted on 29-10-2014. Five fungicides namely, Ridomil Gold, Aliette, Puslan, Defeater and Success were included in the trial. Fungicidal sprays were done according to the schedule. While in control, water spray was only carried out. The standard agronomic practices were followed for better establishment of crop stand and development.

Late Blight disease incidence percentage

Among all the treatments, statistically analyzed data revealed that treatment No. 1 proved efficacious with the least disease incidence as 6.66% as compared to control possessing 100% disease incidence given in table 36.

Treatment no.4 expressed 7.33% disease incidence percentage followed by T3 and T5 with the result of 9% and 15% respectively. Treatment no.2 was also effective compared with that of control.

Table No. 36. Performance of different fungicides against late blight disease

Sr. No.	Treatments	Disease % Means	Percent Decrease/ Control	Yield T/hac.
1	All sprays of Ridomil Gold @2.5 g/ lit. of water	6.66	93.34	29.07
2	All sprays of Aliette @2.5g/lit. of water	21.66	78.34	25.92
3	All sprays of Puslan @2.5 g/ lit. of	9.00	91.00	27.40

	water			
4	All sprays of Defeater @2.5 g/ lit.of water.	7.33	92.67	28.33
5	All sprays of Success @2.5 g/ lit. of water.	15.00	85	26.66
6	Control	100	-	24.99
LSD 5%			4.32	3.47

Tuber yield

It was revealed from the given values in Table No.36, that maximum tuber yield 29.07 t/ha was observed in treatment No.1. Control proved to be the least potato tuber yielder with a magnitude of 24.99 t/ha.

3. Chemical control of black scurf (rhizoctonia sp) through seed treatment.

A trial was laid out for the control of Rhizoctonia disease of potato tubers. The main objective was to search out the most effective fungicide for seed treatment of potato tubers proving to be economical in controlling potato tuber diseases. The experiment was sown on 30-10-2014 with RCBD design having plot size 2.8x6m. The test variety Cardinal was sown with three replications along with six treatments namely , Monceren @1ml/kg seed tuber, Triton @8ml /100kg seed tuber, Benlate @ 3g/kg seed tuber, Topsin-M @ 2g/seed tuber, seed treatment with simple water and untreated seed (control). Data on all the parameters were recorded and potato seed was treated with the selected dose of fungicides before sowing whereas in case of control, seed was not treated with any chemical Table 37.

Table No. 37. Performance of different fungicides against rhizoctonia disease

S.No.	Treatments	Ave. dis. %	Percent dec./ over control	Yield T/ha.
1	T1 Monceren @ 1ml/kg seed tuber	0.33	99.49	25.18
2	T2 Triton @8ml/100kg seed tuber	5.33	91.84	24.07
3	T3 Benlate @ 3g/kg seed tuber	9.33	86.22	23.69
4	T4 Topsin-M @ 2g/kg seed tuber	21.33	67.35	22.77
5	T5(Seed treatment with simple water)	56.00	14.28	21.66
6	T6 Untreated seed(control)	65.33	-	21.29
LSD 5%		2.093.28		

Rhizoctonia disease.

Statistical analysis revealed differences among all the treatments and were found significant. In treatment No.1, disease percentage decrease over control with a value of 99.49% was recorded followed by T2 with the value of 91.84 disease percentage decrease over control whereas in T6, maximum disease incidence with the value of 65.33% was observed.

Tuber yield. The results with their mean values differences showed that treatment No.1.possessed the maximum tuber yield as 25.18 t/ha followed by T2 with the magnitude of 24.07 t/ha yield.T6 untreated seed (control) turned out to be the lowest potato tuber yielder as 21.29 t/ha.

4. Survey of black scurf/rhizoctonia and common scab disease incidence on potato at District Sialkot area for the year 2014-2015.

Table No. 38. Survey of black scurf and common scab diseases at different areas of Sialkot District.

Sr.No	Farmer's Name	Place Vill./city	Variety Sown	Source of Irrigation	Area/ Acre	Rhizoctonia Percentage	Scab Percentage
1	M.ArshidSubhani	Gurri Sialkot	Rocco	Tubewell	18	25	25
2	Haji Ghulam Rasool	Sahowali Sialkot	Rocco+ Kuroda	=	5	15	30
3	Haji Ghulam Nabi	Sahowali Sialkot	Rocco	=	6	20	40
4	M.Amjad	AddaGunn a	Rocco	=	8	15	10
5	Potato Research Station	Sahowali Sialkot	Cardinal, Diamant,S H-5	=	6	80	30
6	M. Nasir	Chowni Sullehrian Sialkot	Rocco+ Kuroda	=	15	20	15
7	Qamar Abbas	ChakKheena Sialkot	Rocco+ Kuroda	=	50	20	15
8	M.Tariq	Bhopalwala Sialkot	Kuroda+ Rocco	=	50	12	15
9	M.Bashir	ChakKheena Sialko	Rocco	=	10	15	10
10	M. Nawaz	ChakKheena Sialko	Rocco	=	20	25	15
11	Nabi Ahmed	Bhopalwala Sialkot	Rocco	=	3	14	15

12	Saifullah	ChakKheena Sialkot	Rocco	=	20	12	10
13	Riasat Ali	ChakKheena Sialkot	Rocco	=	4	18	12
14	M. Kashif	Bhopalwala Sialkot	Kuroda+ Rocco+ Rodio	=	65	25	20
15	MalikSohail Ahmed	Pothein Sialkot	Burna, Bartina	=	60	5	15
16	M.Safdar Bajwa	Paragpur Sialkot	Rocco	=	18	15	12
17	M. Afzal Gujjar	Bhopal- Wala Sialkot	Kuroda	=	10	20	25
18	Sarfraz Ahmed	Bhopal- Wala Sialkot	Kuroda+ Rocco	=	70	15	18
19	M. Ashfaq Cheema	Bhopal- Wala Sialkot	Rocco	=	15	20	15
20	Shafaat Ahmed Bajwa	Chowni sulehrian Sialkot	Rocco	=	18	25	15

Survey was conducted during the harvesting season of Potato crop for the year 2014-2015 in the adjacent locality of district Sialkot. Twenty farmer's field survey report revealed that the maximum disease incidence of Rhizoctonia and Common Scab diseases was 80% and 40% respectively. Whereas minimum common Scab disease incidence as 10% was observed in the farmer's field. It was noticed that where the potato tubers were treated with the fungicides before sowing by the farmers, only 5% Rhizoctonia disease incidence was recorded. Use of "Monceren" proved to be more effective in controlling the Black Scurf/Rhizoctonia disease of Potato up to 99%. Maximum yield reduction of potato tuber occurred during this season due to heavy rain fall and inundation in the district Sialkot area and great economical losses were also faced by the farming community.

3. AGRONOMICAL STUDIES

Potato Research Station, Sahowali (Sialkot)

1. Effect of number of tubers on the yield of new strains, SH-661, SH-718 and SH-1035.

Data could not be recorded due to heavy rain fall and inundation in the experimental area. All the material was damaged/rotten due to stagnant water in the experimental field.

4. FOOD TECHNOLOGICAL STUDIES

1. Screening of varieties /strains for high dry matter contents and specific gravity

Samples (potato tubers) of **44** different strains/varieties were collected from the field after harvesting the crop. The specific gravity and dry matter content data were recorded by potato Hydro meter. Results have been presented rank wise in Table 39.

Table 39. Performance of different strains regarding dry matter at PRI, Sahiwal

Rank	Varieties Name	Specific gravity	Dry matter	Rank	Varieties Name	Specific gravity	Dry matter
1	SL 21-10	1.091	22.4	23	SL 14-37	1.066	17.1
2	SL 10-22	1.080	20.0	24	SL 28-18	1.065	17.0
3	SL 15-21	1.078	19.5	25	SL 10-4	-	-
4	SL 7-26	1.077	19.3	26	SL 11-4	-	-
5	SL 5-2	1.076	19.2	27	SL 9-14`	-	-
6	Lady Rosetta	1.076	19.2	28	SL 8-5	-	-
7	SL 13-16	1.075	19.1	29	SL 5-10	-	-
8	SL 7-45	1.075	19.0	30	SL 1-74	-	-
9	Sante	1.075	19.0	31	SL 11-50	-	-
10	Simply Red	1.074	18.9	32	SL 1-4	-	-
11	SL 21-9	1.073	18.5	33	SL 1-62	-	-
12	SL 13-33	1.073	18.4	34	SL 14-3	-	-
13	SL 28-21	1.072	18.4	35	SL 13-64	-	-
14	SL 4-26	1.070	18.0	36	SL 14-32	-	-
15	SL 13-18	1.071	18.0	37	SL 28-22	-	-
16	SL 18-1	1.070	18.0	38	SL 28-51	-	-
17	UK 60	1.068	17.6	39	SL 22-4	-	-
18	SL 10-9	1.068	17.5	40	SL 18-25	-	-
19	SL 7-21	1.067	17.5	41	SL 28-72	-	-
20	SL 1-47	1.067	17.5	42	SL 16-7	-	-
21	SL 28-32	1.076	17.4	43	SL 28-15	-	-
22	SL 9-13	1.066	17.2	44	SL 28-16	-	-

The objective of this study was to evaluate the strains for processing industry to make value added food product like Potato chips, French fries. As shown in table No.39., the potato strain “SL 21-10” gave high dry matter content and specific gravity (**22.4% & 1.091 respectively**) in comparison to all other varieties and stood top in the ranking position followed by the strain SL 10-22 which also have high dry matter content and specific gravity (**20.0% & 1.080**). Following this pattern the check varieties Sante & Simply Red fell at 8th & 9th ranking

position respectively. Keeping in view the above table, seven potato strains performed better regarding dry matter contents **and** specific gravity as compared to the check varieties and can fulfill the demands for food processing industry to make potato Chips and French fries.