CRP Dryland Systems

Activity Report: 2014

(CA) 4.4 IDENTIFY AND INTRODUCE STRESS TOLERANT, HIGH-YIELDING AND IMPROVED QUALITY VARIETIES OF CEREALS, POTATO, VEGETABLE, HORTICULTURAL, FODDER CROPS THROUGH ON-FARM ADAPTIVE TRIALS

Action Site:

Aral Sea

CG Center involved: CIP

Objective

To identify and introduce stress tolerant, high-yielding and improved quality varieties of potato CIP conducted observation trials in Nukus (action site: Aral Sea region) and Andijan (action site: Fergana valley), Tashkent, during the second growing seasons present in these regions (Mid-July till October). The main objective of trails was testing on productivity CIP breeds, potentially tolerance to heat, salinity and diseases.

Aral Sea Action Site

Eleven potentially tolerance to salinity CIP clones have been selected for testing in Aral Sea Basin (Table 1), due to the well-known problems of salinity, malnutrition, lack of profitable crops and livelihoods in the region.

The trials were carried out in a field belonging to the Karakalpakstan Research Institute of Crop Husbandry (KRICH), Chimbay district, Karakalpakstan Republic (Lat. 42°9'; Long. 59°75'). Potato clones have been planted in 17 July, 2014 after wealth harvesting and harvested in 27 October, 2014.

Twelve trail plots with land size 2.625m^2 (0.7x3.75m) have been established through the following scheme: Planting distance: 0.70 x 0.25 cm, one row per plot, fifteen plants per row. As the basal fertilizers were used 1. Ammonium sulfate (10g/linear metter or 143 kg/ha, 30 N/ha); 2. Monoammonium phosphate (20g/lm or 286 kg/ha, 31N:132P2O5); 3. Potassium chloride (17.5g/lm or 248 kg/ha, 149K2O5). Additional fertilizer Urea has been applied before

the second ridging in the concentration 10g/lm (143kg/ha or 66N). Fertilization formula: 127N:132 P2O5:149K2O.

During the vegetation period the trail plots irrigated eight times through furrow irrigation.

The level of salinity in the soil was tested on all stages of plants' vegetation: at the beginning, during the trial and at harvest, to see the fluctuation of salinity levels during the season. The soil reaction from slight to moderate salinity has been defined (Table 2, 3).

The following biometric measurements have been observed: Plant emergence: marking the date when 80% of plants have emerged, Plant height (cm): at 50 and 70 DAP, No. of stems per plant: 60 DAP. According to collected and analyzed data clones 390478.9, 304406.31, 392797.22 are distinguished with well developed canopy (Table 4).

Harvested potato tubers evaluated by the tubers' size in three gradations: >55mm, 55-25mm, <25mm (Table 5). Deformed tubers were evaluated separately.

Results:

- Clone 390478.9 (31.23 t/ha) had the highest yield according to plant and area harvested, but it was not significantly higher than that of clone 304406.31 (29.69 t/ha) and clone 392797.22 (25.73 t/ha).
- Clone 304406.31 had the highest marketable rate in amount 80.19%. Other two clones 397077.16 (52.24%) and 390478.9 (65.16%) also show high marketability.
- Clone 304406.31 and clone 390478.9 have highest mean tuber weight, accordingly: 85.87 g and 75.46 g.

Conclusion:

Clones 390478.9 and 304406.31 have highest performance yield and tuber marketability, mean tuber weight. These characteristics make them suitable for further use in local conditions.

Outputs:

- Two high productive CIP clones 390478.9, 304406.31, tolerance to salinity, have been defined under soil-climate condition of Chimbay district, Karakalpakstan Republic.
- CIP recommend these two clones for future multiplication and introduction in area with slight-moderate salinity of Aral Sea region.

- Proposed potato clones can be included in crop rotation system as second crop after wealth. Salinity tolerance high productive potato CIP clones 390478.9, 304406.31 give opportunity to improve options for mixed production systems integrating cereals and potato.

Table 1.CIP clones

Variety and Uzbek code	CIP No.
Sarnav	397077.16
C-10	392797.22
C-73	396311.1
L-2	302476.108
L-5	303381.106
L-6	304345.102
L-14	304383.41
L-16	304387.17
L-17	304387.39
L-18	304394.56
L-20	304406.31
Pskem	390478.9

Table 2. Results of soil analysis (Nukus, 2014)

No. of sample	Horizons	Humus content, %	Total Nitrogen, %	Gross Phosphorus, %	Exchange potassium, %
1	0-30	0,53	0,036	0,215	0,0175
2	0-30	0,58	0,038	0,236	0,0180
3	0-30	0,55	0,039	0,226	0,0170
4	0-30	0,54	0,035	0,242	0,0172
5	0-30	0,51	0,037	0,239	0,0175
6	0-30	0,54	0,035	0,245	0,0173
7	0-30	0,59	0,036	0,238	0,0180
8	0-30	0,57	0,035	0,242	0,0180
Mean	0-30	0,55	0,036	0,235	0,0176

Table 3. Water-soluble salts in soil % (avg. of 3-rep).

Variant	Horizons	Chlorine ion	solid residue
1	0-30	0,024	0,288
	0-50	0,021	0,2725
2	0-30	0,022	0,275
	0-50	0,021	0,269
3	0-30	0,025	0,281
	0-50	0,023	0,272
4	0-30	0,028	0,291
	0-50	0,025	0,279
5	0-30	0,026	0,285
	0-50	0,025	0,281
6	0-30	0,025	0,287
	0-50	0,023	0,282
7	0-30	0,029	0,275
	0-50	0,027	0,269
8	0-30	0,027	0,269
	0-50	0,026	0,258

Table 4. Biometric measurements

Clone	Plant height		
	50DAP	60DAP	70DAP
	mean	mean	mean
Sarnav	27.0	28.3	26.1
C-10	48.3	47.8	48.7
C-73	30.7	30.9	30.5
L-2	31.7	30.6	30.7
L-5	31.3	31.8	30.0
L-6	31.7	34.9	35.5
L-14	40.0	36.7	37.2
L-16	34.3	34.1	34.5
L-17	38.3	37.8	33.7
L-18	58.0	59.3	57.4
L-20	42.7	41.9	41.5
Pskem	35.7	35.9	37.9

Table 5. Yield performance of harvested CIP-bred clones, 2014

CIP code	Total yield (t/ha)	Marketability (%)		Unmarketability				Mean tuber weight (g)
				<25 mm		Deformed		
		t/ha	%	t/ha	%	t/ha	%	
397077.16	23.37	12.68	52.24	0.66	17.56	10.01	30.20	77.93
392797.22	25.73	13.92	39.36	1.18	38.64	10.62	22.00	64.95
396311.1	22.26	12.78	35.65	1.61	35.79	7.86	28.56	54.00
302476.108	24.57	16.62	38.44	1.94	44.96	6.00	16.60	39.44
303381.106	12.89	6.64	29.06	1.65	48.93	4.59	22.01	36.67
304345.102	13.25	7.39	36.08	1.21	52.21	4.64	11.71	41.52
304383.41	13.75	8.00	36.64	1.27	36.97	4.47	26.39	46.49
304387.17	16.43	6.64	31.13	1.94	38.94	7.84	29.93	51.34
304394.56	21.75	11.63	39.14	1.67	37.90	8.43	22.96	56.53
304406.31	29.69	26.24	80.19	0.36	12.68	3.08	7.13	85.87
390478.9	31.23	24.38	65.16	0.47	18.17	6.38	16.67	75.46
Mean	21.36	13.36	43.92	1.27	34.80	6.72	21.29	57.29
CV (%)	16.3	36.8	39.3	83.1	48.5	54.0	61.0	37.6
LSD (0.05)	5.93	8.37	29.36	1.80	28.75	6.19	22.09	36.65