



Research Article

Release And Notification of Groundnut Variety (Icgv 97079) Under Rainfed Conditions for Terai, And Inner Terai Through the Nepal Agricultural Research Council

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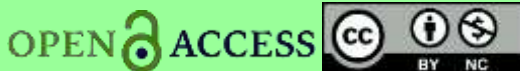
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Abstract

Ground nut (*Arachis hypogaea* L), considered as king of oilseed crop, is a tropical legume mainly grown to produce oil. In context to Nepal, ground nut is used as vegetable oil, confectionery and snacks. In the initial period, ground nut was only confined to the kitchen garden however, in recent year groundnut is growing popularity. Ground nut is grown in upland in rain fed condition during rainy season and it is also grown in river basin as well. Nepal still lacks mega varieties with high yield, high protein and oil content. In order to find out the promising variety, Oilseed research program, NARC has conducted series of trial (Observational nursery trial, Initial yield trial, coordinated varietal trial and Participatory varietal selection) with the introduced foreign genotypes in Randomly Complete Block Design. Through the series of different trials conducted depicted promising genotypes (ICGV 97079, ICGV 07220 and ICGV 07222) from the Coordinated Varietal Trial may be future research material to identify the much-needed variety to meet the groundnut demand of the country. For the present condition, genotypes ICGV 97079 with the potential yield of 2500 kg/ha to 2800kg /ha with 47 % of Protein content, 34 % of oil content and has been identified as the much needed promising line and proposal has been send for the register and release as variety for the farmer production.

Keywords: Ground nut; *Arachis hypogaea* L.. Rainfed Conditions

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Introduction

Ground nut (*Arachis hypogaea* L.), considered as king of oilseed crop, is a tropical legume mainly grown to produce oil. It is an important oil crop (Subrahmanyam et al.,1985; Li et al., 2017; Sui et al., 2018), and about 50% of the peanuts grown in China are used for oil extraction (Yu, 2011). There is no authentic data when domestication occurred but it probably first took place in the valleys of the

Parana and Paraguay River systems in the Gran Chaco area of South America (Smarrt, 1994). With the economic view, each and every part of the ground nut plant are useful. The oilcakes are highly pretentious and can be used as a feed of livestock. During dry season, the groundnut straw can be used as hay for the livestock. Groundnut are considered as highly nutritious food and used in the treatments of mal



nutrition of the children (Briend, 2001). Groundnut is even beneficial to human health as well. It consists of unsaturated fatty acid which helps to maintain the cholesterol level and prevent from the heart disease. They also help to maintain the blood sugars. Groundnut seeds contain 44-56% oil and 22-30% protein on a dry seed basis. In addition, they are a good source of minerals (phosphorus, calcium, magnesium and potassium) and vitamins.

In context to Nepal, ground nut is used as vegetable oil, confectionery and snacks. In the initial period, ground nut was only confined to the kitchen garden however, in recent years groundnut is growing in popularity. Ground nut is grown in upland in rain fed condition during rainy season and it is also grown in river basin as well (Thakur et al., 2013). In case of Nepal, there are no mega varieties which can give the productivity more than (3.5 ton/ ha). There is a strong domestic demand of oils in the country. Yield potential of groundnut is higher than other oilseed crops in Nepal. Therefore, it is an indispensable need of the development of high yielding varieties using groundnut diversity. Based on the reports of land resource mapping project over 572000 ha of land is potential for groundnut cultivation in Nepal. There are 16 vegetable ghee/oil industries operating in Nepal and they are running at 40% of their capacity (Chaudhary, 2010). Breeding work in Nepal is not so advanced, even though conservation of native genetic resources has been started since 1986 (Joshi, 2017). Systematic research and development activities in groundnut were initiated after the signing of a memorandum of understanding between Nepal Agricultural Research Council (NARC) and ICRISAT in 1987 and conducting various activities under AGLOR (Asian grain legumes on-farm research) project. After launching of IFAD-532-ICRISAT project and IFAD-954-ICRISAT Project area of groundnut has increased. ORP, Sarlahi has been conducting different yield trials with an objective of finding high oil content, high yield and bold seed.

Method and Methodology

The experiment conducted was done according to the NARC Research System. Different exotic genotypes and

local Landraces were collected and series of trials were conducted in successive years in different locations. The details of the trials conducted are mentioned in Table 1. Here IET were conducted in Random Complete Block Design (RCBD) trial with 3 replications with 12 genotypes. The individual plot size for the IET was 10 m². Similarly, CVT were also conducted in RCBD design with 3 replications in 4 locations with 9 genotypes. The plot size for CVT was 20 m². PVS were also conducted in RCBD where farmers were considered as replication with 4 genotypes. Regarding the agronomical practice, planting was done with spacing row to row 30cm and plant to plant 15cm. Agronomic practice for groundnut cultivation as recommended from ORP was used with the fertilizer dose of 20:40: 20 kg/ha. Data on parameters days to flowering (DF), days to maturity (DM), grain yield (GY), shelling % and 100 grain weight (100 GW) were recorded and analysis of variance (ANOVA) was done using crop stat. GGE by Plot was done through Meta R to find the overall best yielding variety over all the locations over all the years.

Result

Observation Nursery

In observation nursery conducted on 2066/67 (2009/2010), there were 5 genotypes having more than 2 ton per hectare among which ICGV93077 was highest yielding with 2733 kg/ha followed by ICGV 97079 with the yield of 2676 kg/ha. The details of results of observation nursery are shown in Table 2.

Initial Evaluation Trial

In the initial evaluation trial, 10 high yielding genotypes were selected from observation nursery. In initial evaluation trial every parameter was non-significant whereas days to flowering was highly significant. In context to yield, there were 5 genotypes showing yield above 2 ton per ha. Highest yielding genotypes were ICGV 97079 with the yield of 234 kg /ha followed by ICGV 00441 (2301 kg/ha) and ICGV 98180 (2276 kg/ha). In the study of early leaf spot resistance, ICGV 97079 was found to be highly resistant among all other genotypes. The detail result of initial yield trial is shown in Table 3.

Table 1: Details of trials conducted

S.N.	Experiment	Years	Locations	Reference
1	OBN	2066/67(2009/2010)	ORP, Nawalpur	Annual report 2010
2	IET	2067/68(2010/2011)	NORP, Nawalpur	Annual report 2011 Annual report 2012
3	CVT	2068/69 (2011/12), 2069/70 (2012/13), 2070/71 (2013/14)	Sarlahi, Nepalgunj, Surkhet	Annual report 2012, Annual Report, 2013 Annual Report 2014
4	PVS	2076/77 (2019/20)	Sarlahi, farmers field	Annual report 2020

**Table 2:** Observation Nursery Trial of Medium Groundnut at Nawalpur, Sarlahi 2066/67. (Annual report 2066/67)

S. no	Genotypes	Days to Flower	Days to Maturity	Pods/plant	Shelling Percentage	100 Seed weight	Pod yield kg/ha	Rank For yield
1	ICGV 86124	33	125	20	68	64.9	2258	5
2	ICGV 93163	37	125	28	45	30.7	1411	
3	ICGV 97325	37	125	18	73.5	68.2	1556	
4	ECGN 001	37	120	15	65.3	63.7	1947	6
5	ICGV 94173	33	120	17	65.5	52.7	1824	
6	ICGV97047	33	120	15	76.5	61.4	1280	
7	ICGV 86125	33	124	19	69.5	78.1	1818	
8	ICGV89204	33	124	24	58	44.7	953	
9	ICGV93180	33	124	11	64	41.3	1433	
10	ICGV86699	37	122	18	69.7	38.4	1209	
11	ICGV86564	33	122	18	69	47.7	1831	
12	ICGV93077	33	124	21	18.5	45.5	2733	1
13	ICGV92205	33	124	24	68	43.3	1231	
14	ICGV96318	33	124	18	63.6	41.3	1727	
15	ICGV87846	33	124	25	70	36.4	889	
16	ICGV97228	33	124	13	67	40	104	
17	ICGV94138	33	124	18	74.5	71.5	1707	
18	ICGV00290	33	124	10	70.4	69.5	1140	
19	ICGV95412	37	124	13	70.5	50.5	1653	
20	ICGV00456	37	124	13	70	59.9	1662	
21	ICGV99102	33	124	21	72	43.5	2278	4
22	ICGV00446	33	124	19	80	63.5	493	
23	ICGV94143	33	126	16	63	42.7	1393	
24	ICGV99083	33	126	19	73.5	43.6	1556	
25	ICGV00401	33	126	21	66.3	58.7	1767	
26	ICGV95416	37	128	24	63.5	49.9	1935	
28	ICGV97079	33	126	34	65	62.1	2676	2
29	ICGV00440	33	126	17	64.5	64.5	907	
30	ICGV99219	33	126	17	63.3	36.4	1720	
31	ICGV95005	37	128	25	69.5	34.3	2349	3
32	ICGV99358	37	128	20	71	38.2	1580	

Table 3: Initial Yield trial of medium groundnut at Nawalpur, 2066/67 (2010/11) (Annual report 2067/68).

EN	Varieties	Day to flowering	Days to maturity	Pods/pl	Shelling %	100 swt g	Pod yield kg/ha	Early Leaf spot
1	ICGV 97079	38	107	40	70.6	64.7	2341	2
2	ICGV 95017	37	105	36	70.8	36.2	1668	3.6
3	ICGV 91104	37	109	20	71.1	55.6	2228	4.3
4	ICGV 95005	36	109	39	72.1	35.6	1532	2.7
5	ICGV 00441	37	107	36	68.5	45.2	2301	3.3
6	ICGV 97100	38	109	27	69.3	44.5	1901	3.6
7	ICGV 97142	37	110	61	69	44	1465	3.6
8	ICGV 98180	36	106	43	69.5	48.9	2276	3.6
9	ICGV 97171	36	109	43	72.6	42.9	2268	3.3
10	B4	36	107	45	73.7	47.6	1784	3
	F test	**	Ns	Ns	Ns	NS	Ns	
	CV %	2.01	1.82	27	2.89	10.5	25	
	Lsd 0.05	0.7	107			4.5		



Coordinated Varietal Trial

After the selection of the genotypes in the initial yield trial, coordinated varietal trail was conducted in Sarlahi, Surkhet and Nepalgunj in year 2012, 2013 and 2014 with 11 genotypes including B4 as check genotypes. In the result of CVT in 2012, the average yield among the three location was observed in ICGV 97079 (2577 kg/ha) followed by ICGV 07222 (2090 kg/ha). In the result of CVT in 2013, the average yield among the three location was observed in ICGV 98184 (2454 kg/ha) followed by ICGV 06227 (2347 kg/ha). In the result of CVT in 2014, the average yield among the three location was observed in ICGV 07220

(2651kg/ha) followed by ICGV 06227 (2630 kg/ha). In the location wise, ICGV 98184 showed highest yield up to 3310 kg/ha in Sarlahi.. The detail result of CVT 2014 is shown in Table 4.

In the combined analysis of CVT of all three location and year, genotypes showed high significant for the location and significant for the entry and entry* location. 6 genotypes had yield more than 2 ton per hac. Among the combined analysis (location and Year) highest yield was observed in ICGV 07220 with the yield of 2338 kg/ha and ICGV 97079 with the yield of 2318 kg/ha followed by ICGV 07222 2266 kg/ha. The detail result of CVT 2014 is shown in Table 5.

Table 4: Coordinated Varietal trial at Sarlahi, Surkhet and Nepalgunj , 2011/12, 2012/2013 and 2013/14 (Annual report 2011/12, 2012/13 and 2013/14)

EN	Genotypes	Seed yield kg/ha (2011\2012)				Seed yield kg/ha (2012\2013)				Seed yield kg/ha (2013\2014)			
		Mean	Sarlahi	Surkhet	Nepalgunj	Sarlahi	Surkhet	Nepalgunj	Mean	Sarlahi	Surkhet	Nepalgunj	Mean
1	ICGV 97079	2543	2433	2755	2577	2122	2120	1933	2058	2044	2512	2400	2318
2	ICGV 00441	1939	1337	1645	1640	1380	2267	1850	1832	2038	1575	2500	2038
3	ICGV 98180	1734	1419	1644	1599	2038	2573	2400	2337	2189	2255	2867	2437
4	ICGV 97171	1076	1545	1289	978	2379	1698	1867	1981	3040	1486	2567	2364
5	ICGV 06227	1608	1185	1822	1538	1903	2570	2567	2347	2202	2488	3200	2630
6	ICGV 98184	1354	1370	889	1204	2895	2267	2200	2454	3310	2461	2100	2624
7	ICGV 06423	2237	1355	2355	1982	1880	2118	3033	2344	2240	2266	2967	2491
8	ICGV 07220	2529	1653	1777	1986	2031	2141	2967	2380	2677	1942	3333	2651
9	ICGV 07222	2862	1276	2133	2090	1908	2168	2917	2331	2483	2255	2400	2379
10	ICGV 07247	2789	1281	1600	1890	1938	2292	2833	2354	2674	1686	1967	2109
11	B4	811	1293	1466	1190	1571	1973	1867	1804	2308	2047	2567	2307
F test			**	Ns	**	**	Ns	*		**	Ns	Ns	
CV%			23.5	13.2	27	18.3	22	11.9		14.5	22	21.89	
Lsd0.05			317	-	436	301	-	234		301	-	-	

Table 5. Combined CVT analysis of 3 different years (2013, 2014, 2015) and locations (Sarlahi, Surkhet and Nepalgunj).

E. no	Genotypes	DF	DM	HGW	PPP	sp	Yield
1	ICGV 97079	32.7	133.4	58 b	35.6	72.5	2318 a
2	ICGV 00441	33.3	133.1	49 cd	32.4	70.5	1836 ab
3	ICGV 98180	32.6	134.0	56 bc	31.8	69.1	2124 ab
4	ICGV 97171	33.0	134.9	46d	35.3	70.3	1883 ab
5	ICGV 06227	32.8	131.9	71 a	28.6	67.8	2171 ab
6	ICGV 98184	33.1	133.4	58 b	30.4	68.0	2094 ab
7	ICGV 06423	33.6	135.1	49bcd	34.6	70.8	2272 ab
8	ICGV 07220	33.1	133.8	47 cd	36.4	71.3	2338 a
9	ICGV 07222	32.2	133.4	48cd	37.0	71.9	2266 ab
10	ICGV 07247	33.1	134.7	48cd	35.9	69.4	2117 ab
11	B 4	32.7	133.2	47cd	28.3	67.6	1767 b
Grand mean		32.92	133.7	52	33.3	69.9	2108
Entry		0.98	1.0	0.0	0.9	0.6	0.1
Location		0.00	0.0	0.0	0.0	0.0	0.0
Entry* Location		0.51	1.0	0.9	0.9	0.6	0.4
LSD		2.88	9.8	8.8	15.7	6.4	511.6
CV		9.33	7.8	17.9	50.3	9.8	25.9

**Table 6:** Participatory Varietal Trial on PVS medium groundnut (2076/77) (2020)

SN	Varieties	DM	Pods/pl	Yield kg/ha	Farmers perception	Over all Farmers ranking
1	ICGV 97079	128	36	2058	High yielding, bold and big in size, double in size of check variety, have good test, soft outer cover , easy to break the cover.	1 st
2	ICGV 00440	129	31	1532	Pods are Bold and big size, good in taste Moderate disease	3 rd
3	ICGV 00441	129	37	1622	Pods are medium in size. Moderate disease	2 nd
4	Rajarshee	125	20	1560	Pods are Small in size, had to break the cover and Less disease	4 th

Table 7: Distinctness, Uniformity and stability test in groundnut.

S.no	Variety	Pod beak	Pod constriction	Pod reticulation	Pod length	Pod Width	Seed color	Seed length	Seed Width	Oil content	Protein content
1	ICGV 97079	slight	none	prominent	3.2 to 3.6 cm	1.5 to 1.8 cm	Pinkish white	1.5 to 1.8 cm	0.7 to 0.9 cm	47.27 %	34.22 %

Participatory Varietal Selection (PVS)

In the Participatory varietal selection, 4 most elite genotype were selected for the selection. In the result, ICGV 97079 was found to be mostly liked by farmers in terms of yield (2058 kg/ha), pods size and disease resistant. The detail result of CVT 2014 is shown in Table 6

Distinctness, Uniformity and Stability Test of ICGV 97079

After identification of ICGV 97079 as a promising pipeline Distinctness, Uniformity and Stability Test (DUS) test was conducted. In the DUS test, there was a slight beak in the pod with no constriction and prominent reticulation and has the width of 1.5 cm to 1.8 cm and length of 3.2 to 3.6 cm of the pod. The seed with is 0.7 to 0.9 cm with the length of 1.5 to 1.8 cm with the pinkish white of the seed coat color. In case of nutrition, it has oil content of 42.27 % and has 34.22% of the protein content. The details is shown in Table 7.

Conclusion

Nepal is importing over \$25 million of vegetable oils annually to meet the demand. There is strong domestic demand of oils in the country. The depicted promising genotypes (ICGV 97079, ICGV 07220 and ICGV 07222) from the Coordinated Varietal Trial may be future research material to identify the much-needed variety to meet the groundnut demand of the country. For the present condition, genotypes ICGV 97079 has been identified as the much-needed promising line and proposal has been send for the register and release as variety for the farmer production. ICGV 97079 genotype ground nut has a distinct character with the potential yield of 2500 kg/ha to 2800kg /ha with 47 % of Protein content and 34 % of oil content. Hope this genotype will be release soon from Seed quality Control Center and play an pivotal role to meet he oil demand of our country.

References

- Briend A (2001) Highly nutrient-dense spreads: a new approach to delivering multiple micronutrients to high-risk groups. *British Journal of Nutrition* **85**(S2): S175-S179.
- Chaudhary RN (2010) Coordinators Report on Summer Oilseed Crops 26th National Summer Crops Workshop, National Summer Crops Workshop, National Maize Research Program Rampur, Chitwan.
- Joshi BK (2017) Conservation and utilization of agrobiodiversity advanced from 1937 to 2017 in Nepal. In: *Krishi Sanchar Smarika, Agricultural Information and Communication Center (AICC), MoAD*; 181-208.
- ORP (2010) Observation Nursery Trial. Ground nut. Annual Report 2066/67 (2009/2010). Oilseed Research Program, NARC, Nawalpur, Sarlahi, Nepal.
- ORP (2012) Coordinated Varietal Trial. Ground nut. Annual Report 2068/69 (2011/12). Oilseed Research Program, NARC, Nawalpur, Sarlahi, Nepal.
- ORP (2013) Coordinated Varietal Trial. Ground nut. Annual Report 2069/70 (2012/13). Oilseed Research Program, NARC, Nawalpur, Sarlahi, Nepal.
- ORP (2014) Coordinated Varietal Trial. Ground nut. Annual Report 2068/69 (2013/14). Oilseed Research Program, NARC, Nawalpur, Sarlahi, Nepal.
- ORP (2020) Coordinated Varietal Trial. Ground nut. Annual Report 2076/77 (2019/02). Oilseed Research Program, NARC, Nawalpur, Sarlahi, Nepal.
- Smartt J (1994) The groundnut in farming systems and the rural economy—a global view. In *The groundnut crop* (pp. 664-699). Springer, Dordrecht.



Subrahmanyam P, Reddy LJ, Gibbons RW, McDonald D (1985) Peanut rust: A major threat to peanut production in the semiarid tropics. 813–819.

Sui JM, Jiang PP, Qin GL, Gai SP, Zhu D, Qiao LX, Wang JS (2018) Transcriptome profiling and digital gene expression analysis of genes associated with salinity resistance in peanut. *Electronic Journal of Biotechnology* 19–25.

Thakur SB, Ghimire SK, Shrestha SM, Chaudhary NK and Mishra B (2013) Variability in groundnut genotypes for tolerance to drought. *Nepal Journal of Science and Technology* **14**: 41-50.

Yu SL (2011) *Genetics and Breeding of Peanuts in China*. Shanghai Science and Technology Press, Shanghai. 29.