

Quality analysis of marketed seeds of some crops in Nepal

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Abstract

Seed samples from seed traders were collected for the three fiscal years (2007/08, 2008/09 and 2009/10) from thirty-nine districts of Nepal. A total of 206 samples from fourteen districts in 2007/08, 206 samples from seventeen districts in 2008/09, and 208 samples from twenty-five districts in 2009/10 were collected for analyzing quality of marketed seeds of crops. Seed samples were collected from the districts where seed act of Nepal was implemented and from where it was not implemented as well. These samples were tested for germination and physical purity in each year separately. Germination percent was determined by top of the paper (TP), between the paper (BP) and sand as recommended for crops/varieties. Percentage of physical purity of seed was measured by separating inert matter, weed seeds, and other crop seeds from seed sample. Percentage of each component was determined by weight basis. From the analysis it was found that quality standard of sold vegetable seeds in market was not improved with respect to germination. Likewise, marketed seed quality of vegetables such as onion, cauliflower, sponge gourd, ridge gourd, bitter melon, broccoli, cabbage, radish, tomato, chilly, brinjal, *Ghiusimi*, and mustard were found deteriorated each year. However, physical purity of almost all samples each year was recorded satisfactory. There was no difference on quality of seeds with respect to the districts implementing and not implementing seed act. Of the seed quality standard, germination percentage was the most important attribute that should be considered so far as seed quality standard is concerned.

Key words: Germination, physical purity, agro-vets, quality standards

Introduction

Crop productivity and the quality of production primarily depend upon the quality of seed owing to its relationship with the genetic characteristics. Seed has different quality attributes such as purity (physical and genetic), germination, moisture, vigor and health which were assed in seed testing laboratory as a routine test. Germination and purity are most important qualities of the seed. More than 90% of total supplied seed is through farmers' seed system in Nepal. However, Nepalese farmers have limited access to quality seed of desired varieties due to lack of institutionalized production, processing, quality control and distribution systems. The existing service providers both the government and the private sectors are far behind meeting the seed demand of the country. The quality seed replacement rate (SRR) of

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main cereals is 8.3%, except vegetables, is discouragingly very low as compared to SAARC countries 10-20%.

Seed Act 1988, Seed Regulation 1997, and National Seed Policy, 1999 are legal instruments available for functioning seed regulatory measures in Nepal. Both public and private sectors have been involved in seed production, processing, testing as well as import and export of seed as per provision of Nepal seed legislation. Hybrid seeds for vegetables, maize and paddy demand primarily are met by seed import. Recently 10 importing houses are involved in import of hybrid seeds (SQCC, 2011) and distributed by 1853 agro-vets and seed traders (AED, 2008) across the country of which 1469 are entrepreneurs which have been registered in Seed Quality Control Centre (SQCC) and have been provided license for seed business (Table 1). Seed Quality Control Centre (SQCC) is providing the training to seed traders and registered producers on seed legislation and Quality control system in Nepal; seed production technology, seed storage, and registration procedures of seed traders. Quality aspect of marketed seeds by agro-vets is not tested and monitored enough in a systematic way till date. In this regard, this study was carried out to analyze the quality standards (germination and physical purity) of seeds sold in thirty-nine districts of Nepal so that marketed quality of seeds in these districts could be known for further improvement as well.

Table 1. Eco-belt wise distribution of licensed seed traders in Nepal

Development Region	Terai	Mid Hills	High Hills	Total
1. Eastern	303	13	0	316
2. Central	311	115	0	426
3. Western	252	77	0	329
4. Mid-Western	133	91	0	224
5. Far-Western	139	35	0	174
Total	1138	331	0	1469

Source: SQCC, 2011

Materials and methods

Seed sampling

Seed samples from seed traders were collected for three fiscal years (2007/08, 2008/09 and 2009/10) from thirty-nine districts. A total of 206 samples from fourteen districts in 2007/08, 206 samples from seventeen districts in 2008/09 and 208 samples from twenty-five districts in 2009/10 were collected. Also seed samples were collected from four, four and twelve districts in aforementioned fiscal years respectively where the Seed Act was not implemented yet. The names of the districts where seed sample collection were done:

- 1) Seed Act implemented districts: Banke, Bhaktapur, Chitwan, Dang, Dhanusha, Ilam, Kailali, Kapilvastu, Kaski, Kathmandu, Lalitpur, Makwanpur, Morang,

Nawalparasi, Nuwakot, Panchthar, Parsa, Rauthahat, Rupendehi, Saptari, Sarlahi, Siraha and Sunsari.

- 2) Seed Act not implemented districts: Baglung, Dhading, Dolkha, Gorkha, Gulmi, Kavre, Lamjung, Myagdi, Plapa, Parbat, Pyuthan, Ramechhap, Rolpa, Surkhet, Syanga and Tanhu.

Analytical methods

These samples were tested in Central Seed Testing Laboratory in Hariharbhawan Lalitpur, Nepal for germination and physical purity in each year separately. Germination percent was determined by top of the paper (TP), between the paper (BP) and sand as recommended for crops/varieties. Physical purity was measured by separating inert matter, weed seeds and other crop seeds from seed sample. Percentage of each component was determined by weight.

Result and discussions

Germination and physical purity trend

Table 2 shows the over all percentage of seed samples within standard in term of germination (%) and physical purity (%) trend of last nine years. In general, quality standards of sold seeds in market showed increasing trend in recent years except germination quality in 2008/09 in which there was only 66% samples within the set standards.

Table 2. Quality status of marketed seed sample

Fiscal year	Germination (%) within standard	Physical purity(%) within standard
a. 2001/02	56	NA (Not available)
b. 2002/03	73	NA (Not available)
c. 2003/04	69	NA (Not available)
d. 2004/05	70	88
e. 2005/06	73	100
f. 2006/07	84.5	94
g. 2007/08	81.07	96.36
h. 2008/09	66.07	95.83
i. 2009/10	81.73	100

Source: SQCC, 2010

Germination status in 2007/08

Table 3 shows the percentage of seed samples below standard in term of germination (%) in 2007/08. Test result of twelve vegetables seeds sold in market showed that percent of

samples below standard ranges from 11-100%. Similarly range of germination also varied from 5-99 %. Mainly sponge gourd, onion, cauliflower, and cabbage seed samples indicated very discouraging status of germination as compared to prescribed standards by National Seed Board (NSB).

Table 3. Germination status of marketed seed sample in 2007/08

Crop	Total No. of samples	Samples below standard (%)	Germination (%)	Fixed standard (%)
1. Bitter Gourd	3	33 (1)	63-87	65
2. Cabbage	2	50 (1)	67-73	70
3. Cauliflower	8	88 (7)	7-70	70
4. Cow Pea	7	29 (2)	5-97	70
5. Cucumber	8	25 (2)	54-94	65
6. Mustard	19	11 (2)	68-95	75
7. Onion	7	86 (6)	32-74	65
8. Okra	19	32 (6)	36-91	70
9. Radish	37	19 (7)	13-99	70
10. Soybean	2	50 (1)	62-90	75
11. Sponge Gourd	1	100 (1)	62	65
12. Tomato	7	29 (2)	60-95	70

No of quality standard not fixed samples = 28

Germination status in 2008/09

Table 4 shows the percentage of seed samples below standard in term of germination (%) in 2008/09. Analysis result of fifteen vegetables seeds samples and one each seed samples of jute and wheat sold in market showed that percent of samples below standard ranges from 20-100%. Similarly range of germination also varied from 0-99 %. Like in 2007/08 sponge gourd, bitter gourd, broccoli, onion, cauliflower, Jute and wheat seed samples indicated very poor status of germination as compared to prescribed standards by NSB.

Table 4. Germination status of marketed seed sample in 2008/09

	Crop	Total No. of samples	Samples below standard (%)	Germination % (Range)	Fixed standard %
1.	Bitter Gourd	7	72 (5)	0-96	65
2.	Brinjal	5	40 (2)	27-89	65
3.	Broccoli	1	100 (1)	23	70
4.	Carrot	2	50 (1)	54-67	65
5.	Cauliflower	3	33 (1)	38-89	70
6.	Chilly	5	40 (2)	37-81	65
7.	Cow Pea	12	25 (2)	46-98	70
8.	Jute	2	100 (2)	1-68	75
9.	Bean (Ghiusimi)	3	67 (2)	1-82	70
10.	Mustard	24	33 (8)	0-92	75
11.	Okra	20	20 (4)	31-91	70
12.	Onion	4	50 (2)	41-75	65
13.	Radish	40	33 (13)	15-99	70
14.	Spinach	4	25 (1)	34-87	65
15.	Sponge Gourd	7	57 (4)	20-70	65
16.	Tomato	7	29 (2)	27-98	70
17.	Wheat	2	50 (1)	37-95	80

No of quality standard not fixed samples = 38

Germination status in 2009/10

Table 5 shows the percentage of seed samples below standard in term of germination (%) in 2009/10. Test result of fourteen vegetables seed samples, four samples of paddy and five samples of wheat sold in market showed that percent of samples below standard ranged from 16-100%. Similarly range of germination also varied from 0-100 %. Like in previous years in 2009/10 also gourds, pumpkin, wheat and tomato seed samples indicated very poor status of germination as compared to prescribed standards by NSB.

Table 5. Germination status of marketed seed sample in 2009/10

Crop	Total No. of samples	Samples below standard (%)	Germination (%)	Fixed standard (%)
1. Bean	5	40 (2)	36-97	70
2. Brinjal	6	17 (1)	58-91	65
3. Chilly	4	25 (1)	56-89	65
4. Cow pea	16	19 (3)	45-98	70
5. Ghusimi	6	17 (1)	13-99	70
6. Mustard	24	54 (13)	0-94	75
7. Onion	7	29 (2)	38-82	65
8. Pumpkin	2	100 (2)	29-56	65
9. Radish	32	16 (5)	0-100	70
10. Paddy	4	25 (1)	57-99	80
11. Ridge Gourd	1	100 (1)	58	65
12. Spinach	3	33 (1)	55-85	65
13. Tomato	10	40 (4)	3-88	65
14. Wheat	5	40 (2)	75-96	80

No of quality standard not fixed samples = 31

Average germination status in each year

Year wise below standard % of vegetable seed samples for germination test found 22.47 % (2007/08), 31.5 % (2008/09) and 22.6% (2009/10). It indicates that poor quality seeds have been transacted in the market in later years and this practice has not yet been improved. This is serious violation of maintaining seed quality standard in the market.

Physical purity analysis status

Table 6 shows the number of seed samples within or above standard, below standard and result not available (NA) in term of physical purity during three years of study. Only two samples (spinach and bean) out of fifty-six samples found below standard in 2007/08, only one sample (radish) out of twenty-four samples found below standard in 2008/09 and no one sample was below standard in 2009/10 out of thirty samples recorded in the year as well. Physical purity of almost all samples each year measured within and above as compared to prescribed standards indicates satisfactory improvement on this aspect.

Table 6. Physical purity status of marketed seed sample in three years

Description	2007/08	2008/09	2009/10
a. Samples within standard (No.)	54	23	30
b. Result not available (No.)	150	182	178
c. Samples below standard (No.)	2	1	0
d. Total	206	206	208

Conclusions and recommendations

Quality Standards of sold vegetable seeds in market each year has not improved significantly during the study period. Seeds of onion, cauliflower, sponge gourd, ridge gourd, bitter gourd, broccoli, cabbage, radish, tomato, chilly, brinjal, *Ghiusimi*, mustard sold in the market were of mostly poor quality each year in term of germination. So, germination aspect has to be considered well and more attention be paid in future seed quality control programs. However, Physical purity of most of the samples each year measured within and above as compared to the prescribed standards. On the basis of study, following steps should be taken for improving quality of marketed seeds in Nepal:

- Comprehensive programs for sensitize and public awareness is needed
- Monitoring and supervision should make Stronger
- Seed quality standards fixation of local varieties be done
- Seed legislation has to be enforced strictly in all districts

Limitations of the study

This study is not complete one and it does not cover all aspects of seed quality control, hence following are the limitations of the study:

- Hybrid seed samples were not collected and analysed
- Sample size was small in some crops
- Few districts were only replicated in each year
- Seed storage conditions was not included
- Physical purity analysis of all samples was not done

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