

EVALUATION ON POSTHARVEST SEED QUALITY OF THREE SELECTED LABLAB BEAN CULTIVARS

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Abstract

The study was carried out the seedling growth of three selected lablab bean cultivars *Lablab niger* Medik var. *lignosus* Prain cv. Pe-maung-makhaw (V₁), cv. Pe-sau (Yin-mar) (V₂) and cv. Pe-gyi (Thet-yin) (V₃) effected by different duration of seeds storage and storage materials. Postharvest storage of seeds were intended to save seeds and otherwise they were be destroyed mainly by insects and pests. Treatments included four different storage materials bottles, tins, penan bags, plastic bags were used for the seed storage of lablab bean under room temperature for 6 months. The result showed that the highest seed germination and survival percentages were obtained in cv. Pe-maung-makaw (V₁) and the lowest percentage in cv. Pegyi (V₃) after 2, 4 and 6 months storage. Before storage, increased shoot length 7 DAS and 14 DAS, root length 14 DAS, seedling vigor index 7DAS and seedling vigor index 14 DAS were found in cv. Pegyi (V₃). After 2, 4 and 6 months storage, increased shoot length 7DAS and 14 DAS, seedling vigor index 7DAS and seedling vigor index 14 DAS were found in cv. Pe-maung-makaw (V₁) and decreased in cv. Pegyi (V₃). Before storage, increased root length 14DAS was found in cv. Pesau (V₂) and cv. Pegyi (V₃) than the cv. pe-maung-makaw (V₁). Among the different storage materials, seeds stored in bottles gave many benefits to be the best performance of seedling such as the highest percentage of seed germination and survivals. Bottles should be used as storage container during storage.

Keywords: seed growth, duration of seed storage, storage materials

Introduction

Pulses are grain legumes or food legumes belonging to the family Fabaceae. These are protein rich staple food, and important source of human food and animal feed. High quality seed leads to excellent seedling performance in the field. It is the ultimate basis of successful companies that breed crop plants for seed production.

Quality seeds are characterized by maintaining a high germination rate and stable content after storage. However, seeds gradually lose quality and viability after harvest (Coolbear, 1995). In addition, environmental stresses in the field or during harvest can compromise seed quality and storability. Besides decreasing germination, the undesirable consequences of seed deterioration include unpalatable food and inferior products.

Storage and upkeep of agricultural products are very important postharvest activities. Considerable amount of food grains is being spoiled after harvest due to lack of sufficient storage and processing facilities (Singh and Satapathy, 2003).The storage is an important aspect of post-harvest management. Therefore, the supply has to be maintained by proper storage throughout the year.

Storage protects the quality of grains from deterioration and help in stabilization of prices by regularizing demand and supply. It has been reported that the storage loss caused by insects, rodents and microorganisms are maximum. Lack of storage facilities forced the farmers to sell their product at low price. (Pangale, 1976). Storage practices vary and there are small or big storehouses, indoor or outdoor, temporary or permanent and individual or community storage structure (Jain *et al.*, 2004).

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Packaging is a practice to protect the product from any damage during storage and protect the quality. Improve conservation and storage structures to reduce postharvest losses, improve nutrition standard; bring a better price to the grower (Canada, 2006).

In the present work, a detailed study has been undertaken evaluation of storage condition of three lablab bean cultivars *Lablab niger* Medik var. *lignosus* Prain cv. Pe-maung-makhaw (V₁), cv. Pe-sau (Yin-mar) (V₂) and cv. Pe-gyi (Thet-yin) (V₃). In the study, treatments include four different storage materials bottles, tins, penan bags and plastic bags were used for under room temperature for 6 months.

Materials and Methods

Time and Place of the Study

The study was carried out in Campus of Hinthada University, Hinthada District from April to October 2014.

Preparation of Materials and Methods

The seeds for this experiment were collected from the field of Department of Botany, University of Hinthada. During the experiment, temperature of storage room was 23.5–32.5°C and relative humidity (RH) was 69-90%.

Determination of Seed germination and Survival percentages after Seed storage

Lablab bean seeds stored with different packaging materials for 0, 2, 4 and 6 months were planted humus with sand in pots. A total 25 seeds per treatment were sown in each pot. Each treatment consisted of three replications. The germination percentage was determined in all treatments at one week after sowing seeds. The survival percentage was determined in all treatments at two weeks after sowing seeds.

Data Collection

Relative humidity (RH) and temperature were recorded at 0, 2, 4 and 6 months interval during storage under room temperature. Germination and survival percentages, shoot length, root length, seedling vigor index were recorded at 0, 2, 4 and 6 months, respectively.

Experimental Design and Statistical Analysis

This experiment consisted of 4 treatments as bottle, tin, penan bag, plastic bag with 3 replications using completely randomized design (CRD). The data were statistically analyzed by SAS software. Means of all treatments were compared using LSD (Least Significant Differences) at 5% level of significance.

Methods

Germination and Survival Percentages

The percentages of germination and survival were calculated by the following formula (ISTA,1987).

$$\text{Germination (\%)} = \frac{\text{Total number of germinating seeds}}{\text{Total number of sown seeds}} \times 100$$

$$\text{Survival (\%)} = \frac{\text{Total number of survived plants}}{\text{Total number of sown seed}} \times 100$$

Determination of Seedling Vigor Index

Seedling vigor index was determined using the following formula (ISTA, 1987).

Seedling Vigor Index = germination (%) x shoot length (cm)

Results

Storage Room Temperature and Relative Humidity

During seeds storage, the lowest storage room temperature was determined as 23.5°C in April and the highest room temperature 32.5°C also occurred in April among the records within seven months. However, RH at storage room was high in percentage in August 90% and minimum in percentage was obtained 69% in April, 2014.

Table 1 The storage room temperature and relative humidity data during the growing period of lablab beans

Parameters	Storage period						
	April	May	June	July	August	September	October
Maximum Temperature(°C)	32.5	31.5	30.6	30	29.3	31.2	31.4
Minimum Temperature (°C)	23.5	24	24.4	24	24	23.5	23.7
Relative Humidity (%)	69.00	70.00	85.00	87.50	90.00	86.00	80.12

Table 2 Germination percentage of three selected lablab bean cultivars after storing room temperature

Cultivars and Treatments	Seed Germination (%)				Mean
	0 month	2 months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V ₁)	100 a	96.67 a	89.00 a	87.33 a	93.25
Pesau (Yinn-mar) (V ₂)	100 a	79.67 b	72.67 b	77.00 b	82.33
Pegyi (Thet -yin) (V ₃)	100 a	75.33 b	70.67 b	67.00 c	78.25
F-test	Ns	*	**	**	
LSD (5%)	-	10.9	3.78	4.5	6.30
CV (%)	-	11.46	4.3	5.15	6.97
Treatment					
Bottle	-	90.22 a	85.33 a	81.78 a	85.78
Tin	-	84.44ab	76.44 ab	78.67 a	79.85
Penan Bag	-	83.11 ab	76.00 ab	75.56 a	78.22
Plastic Bag	-	77.78 b	72.00 b	72.44 a	74.07
F-test	-	*	*	Ns	
LSD (5%)	-	9.55	12.02	14.77	12.11
CV (%)	-	11.49	15.67	19.35	15.50

Means with the same letter are not significantly different. **p ≤0.01; *p ≤0.05 ns = non significant

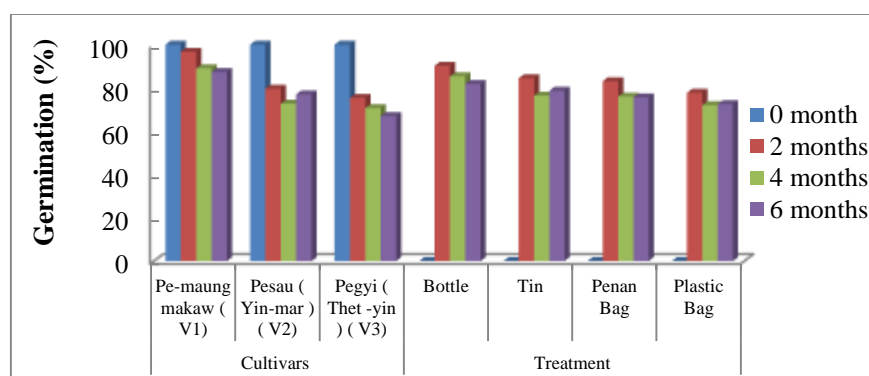


Figure 1 Germination percentage of three selected lablab bean cultivars after storing room temperature

Table 3 Significant levels and interaction for germination percentage of three selected lablab bean cultivars after storing room temperature

Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	1525.78 *	1213.78**	1240.44 **
Treatment (trt)	235.11 *	284.89 ns	145.19 ns
Var x trt	117.78 ns	81.33 ns	215.85 ns

@ values are the mean square for the factor divided by the total sum squares. ** P ≤ 0.01, *P ≤ 0.05 , ns = non significant. cv = lablab bean cultivars, trt= Bottle , Tin , Penan bag and Plastic bag

Table 4 Survival percentage of three selected lablab bean cultivars after storing room temperature

Cultivars and Treatments	Seed Survival (%) at 14 DAS				Mean
	0 month	2months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V ₁)	100 a	96.67 a	89.00 a	84.67 a	92.59
Pesau (Yinn-mar) (V ₂)	100 a	79.67 b	72.67 b	78.67 a	82.75
Peyi (Thet -yin) (V ₃)	100 a	75 .33 b	70.67 b	65.00 b	77.75
F-test	ns	*	**	*	
LSD (5%)	-	10.9	11.11	11.25	11.09
CV (%)	-	11.46	4.30	13.03	9.60
Treatment					
Bottle	-	90.22 a	85.33 a	81.78 a	85.78
Tin	-	84 .44ab	76.44 ab	78.67 a	79.85
Penan Bag	-	83.11 ab	76.00 ab	73.33 a	77.48
Plastic Bag	-	77.78 b	72.00 b	70.67 a	73.48
F-test	-	*	*	ns	
LSD (5%)	-	9.55	12.02	13.16	11.57
CV (%)	-	11.49	15.68	17.46	14.88

Means with the same letter are not significantly different. **p ≤ 0.01; *p ≤ 0.05 ns = non significant.

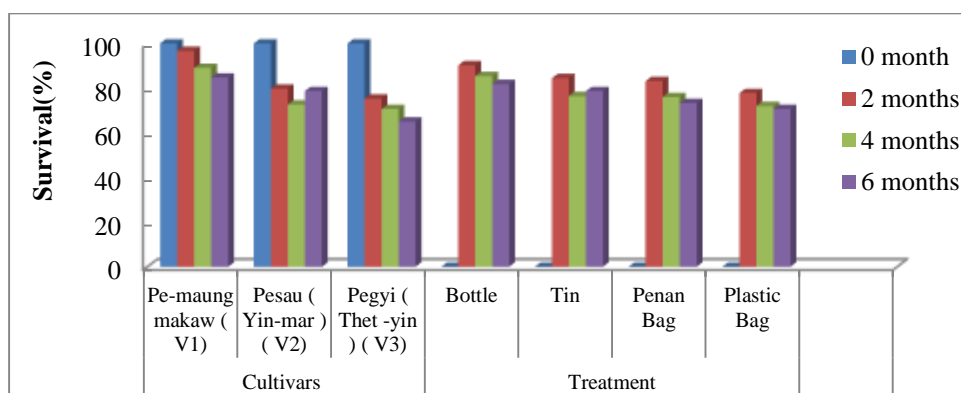
**Figure 2** Survival percentage of three selected lablab bean cultivars after storing room temperature

Table 5 Significant levels and interaction for survival percentage of three selected lablab bean cultivars after storing room temperature

Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	1525.78 *	1213.78**	1219.11 *
Treatment (trt)	235.11 *	284.89 ns	228.00 ns
Var x trt	117.78 ns	81.33 ns	367.55 ns

@ values are the mean square for the factor divided by the total sum squares. ** P ≤ 0.01, *P ≤ 0.05 , ns = non significant. cv = lablab bean cultivars, trt= Bottle , Tin , Penan bag and Plastic bag

Table 6 Shoot length of three selected lablab bean cultivars after storing room temperature at 7DAS

Cultivars and Treatments	Shoot Length (7DAS) (%)				Mean
	0 month	2 months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V ₁)	16.92 a	22.48 a	22.97 a	21.71 a	21.02
Pesau (Yinn-mar) (V ₂)	17.36 a	20.23 ab	19.16 b	19.20 b	18.99
Pegyi (Thet -yin) (V ₃)	22 a	19.79 b	17.04 c	16.80 c	18.91
F-test	Ns	**	**	**	
LSD (5%)	-	2.28	1.6	1.86	1.91
CV (%)	-	9.64	7.18	8.52	8.45
Treatment					
Bottle	-	23.82 a	22.41 a	21.94 a	22.72
Tin	-	22.99 a	20.09 b	20.03 a	21.04
Penan Bag	-	19.38 b	18.64 bc	17.54 b	18.52
Plastic Bag	-	17.15 b	17.60 c	17.44 b	17.40
F-test	-	**	**	**	
LSD (5%)	-	2.64	1.78	2.23	2.22
CV (%)	-	12.81	9.14	11.69	11.21

Means with the same letter are not significantly different. **p ≤ 0.01; *p ≤ 0.05 ns = non significant

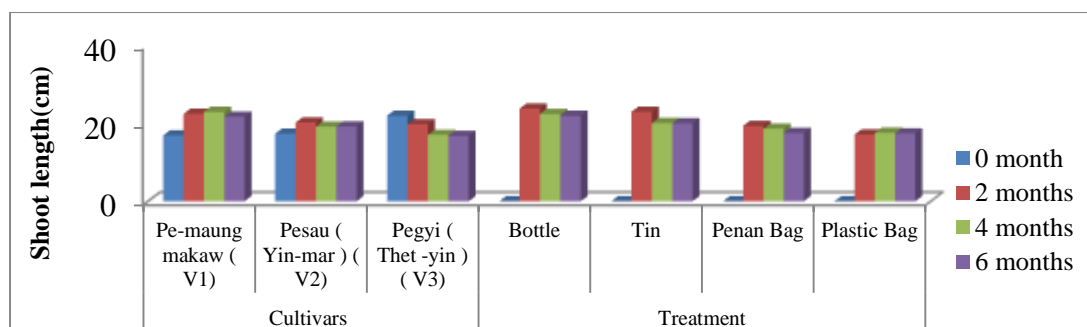


Figure 3 Shoot length of three selected lablab bean cultivars after storing room temperature at 7 DAS

Table 7 Significant levels and interaction for shoot length of three selected lablab bean cultivars after storing room temperature at 7DAS

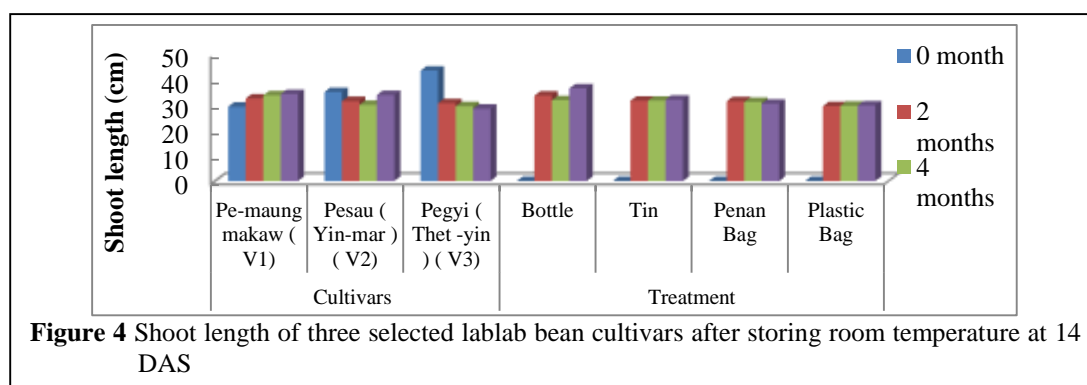
Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	25.13**	109.12 **	72.41 **
Treatment (trt)	87.65 **	39.07 **	42.12 **
Var x trt	4.56 ns	17.06 **	12.12 ns

@ values are the mean square for the factor divided by the total sum squares. ** P ≤ 0.01 , ns = non significant. cv = lablab bean cultivars, trt= Bottle , Tin , Penan bag and Plastic bag

Table 8 Shoot length of three selected lablab bean cultivars after storing room temperature at 14 DAS

Cultivars and Treatments	Shoot Length (14DAS) (%)				Mean
	0 month	2 months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V ₁)	29.25 a	32.53 a	33.75 a	34.26 a	32.45
Pesau (Yinn-mar) (V ₂)	35.05 a	31.48 a	29.96 b	33.90 a	32.60
Pegyi (Thet -yin) (V ₃)	43.5 a	30.67 a	29.46 b	28.47 b	33.03
F-test	ns	Ns	*	**	
LSD (5%)	-	3.26	3.44	2.82	3.17
CV (%)	-	9.12	9.78	7.73	8.88
Treatment					
Bottle	-	33.65 a	31.80 a	36.52 a	33.99
Tin	-	31.67 ab	31.67 a	32.05 b	31.80
Penan Bag	-	31.44 ab	31.14 ab	30.48 bc	31.02
Plastic Bag	-	29.49 b	29.63 b	29.78 c	29.63
F-test	-	*	**	**	
LSD (5%)	-	2.52	1.74	1.81	2.02
CV (%)	-	8.04	5.63	5.65	6.44

Means with the same letter are not significantly different. **p ≤0.01; *p ≤0.05 ns = non significant.

**Figure 4** Shoot length of three selected lablab bean cultivars after storing room temperature at 14 DAS**Table 9 Significant levels and interaction for shoot length of three selected lablab bean cultivars after storing room temperature at 14DAS**

Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	913674.79 *	575074.43 *	2188635.87**
Treatment (trt)	621923.55 **	529023.3 *	1555538.99**
Var x trt	315673.27 **	146480.90ns	722395.68*

@ values are the mean square for the factor divided by the total sum squares. ** P ≤ 0.01, *P ≤ 0.05, ns = non significant. cv = lablab bean cultivars, trt= Bottle, Tin, Penan bag and Plastic bag

Table 10 Root length of three selected lablab bean cultivars after storing room temperature at 14 DAS

Cultivars and Treatments	Root Length (14DAS)				Mean
	0 month	2 months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V1)	4.56 a	5.78 a	6.25 a	6.10 a	5.67
Pesau (Yinn-mar) (V2)	6.8 a	5.43 a	6.11 a	6.04 a	6.1
Pegyi (Thet -yin) (V3)	6.8 a	4.92 a	5.09 a	6.01 a	5.71
F-test	ns	ns	ns	ns	
LSD (5%)	-	0.96	1.19	0.52	0.89
CV (%)	-	15.61	18.04	7.60	13.75
Treatment					
Bottle	-	5.67 a	6.61 a	6.59 a	6.59
Tin	-	5.58 a	5.74 b	6.38 a	5.90
Penan Bag	-	5.40 ab	5.52 b	6.15 a	5.69
Plastic Bag	-	4.85 b	5.40 b	5.09 b	5.11
F-test	-	**	**	*	
LSD (5%)	-	0.69	0.58	0.96	0.74
CV (%)	-	12.82	9.96	16.03	12.94

Means with the same letter are not significantly different. **p ≤0.01; *p ≤0.05 ns = non significant.

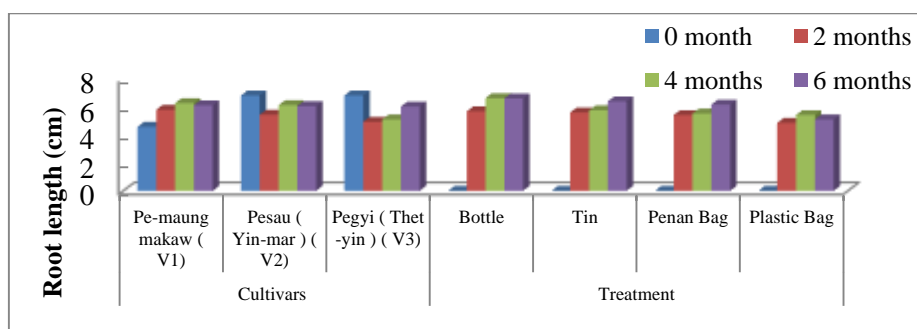


Figure 5 Root length of three selected lablab bean cultivars after storing room temperature at 14 DAS

Table 11 Significant levels and interaction for root length of three selected lablab bean cultivars after storing room temperature at 14DAS

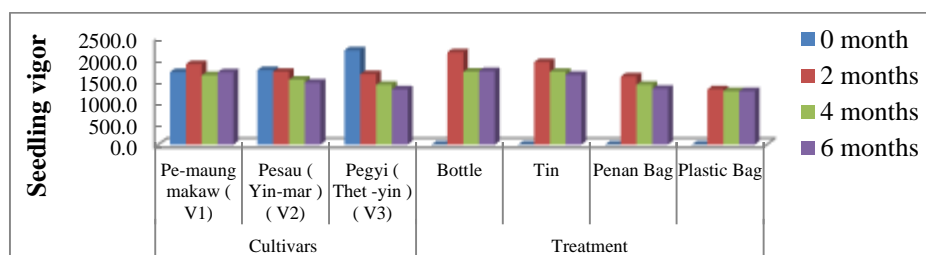
Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	2.23 ns	4.80 ns	0.02 ns
Treatment (trt)	1.21 **	2.69 **	4.0 *
Var x trt	1.17 ns	2.42 **	4.62 **

@ values are the mean square for the factor divided by the total sum squares. ** P ≤ 0.01, *P ≤ 0.05, ns = non significant. cv = lablab bean cultivars, trt= Bottle , Tin , Penan bag and Plastic bag

Table 12 Seedling vigor of three selected lablab bean cultivars after storing room temperature for at 7DAS

Cultivars and Treatments	Seedling Vigor Index (7 DAS)				Mean
	0 month	2 months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V ₁)	1692.0 a	1877.0 a	1621.10 a	1685.74 a	1718.93
Pesau (Yinn-mar) (V ₂)	1736.67 a	1700.2 a	1515.90 ab	1448.19 b	1600.24
Pegyi (Thet -yin) (V ₃)	2200 a	1645.2 a	1396.88 b	1287.48 b	1632.39
F-test	ns	ns	*	*	
LSD (5%)	-	340.24	141.01	191.78	224.34
CV (%)	-	17.24	8.23	11.48	12.32
Treatment					
Bottle	-	2154.5 a	1701.4 a	1714.7 a	1856.87
Tin	-	1926.0 b	1699.8 a	1627.9 a	1751.23
Penan Bag	-	1591.5 c	1397.0 b	1303.0 b	1430.50
Plastic Bag	-	1291.4 d	1247.0 b	1249.6 b	1262.67
F-test	-	**	**	**	
LSD (5%)	-	219.01	255.67	271.08	248.59
CV (%)	-	12.7	17.08	18.57	16.12

Means with the same letter are not significantly different. **p ≤ 0.01; *p ≤ 0.05 ns = non significant

**Figure 6** Seedling vigor of three selected lablab bean cultivar after storing room temperature at 7 DAS**Table 13 Significant levels and interaction for seedling vigor of three selected lablab bean cultivars after storing room at 7DAS**

Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	176048.84 ns	151019.21*	481733.74 *
Treatment (trt)	1289147.86 **	463725.95**	483602.15**
Var x trt	106796.19 ns	159946.40ns	182044.58ns

@ values are the mean square for the factor divided by the total sum squares** P ≤ 0.01 , . *P ≤ 0.05 , ns = non significant. cv = lablab bean cultivars, trt= Bottle , Tin , Penan bag and Plastic bag

Table 14 Significant levels and interaction for seedling vigor of three selected lablab bean cultivars after storing room temperature at 14 DAS

Cultivars and Treatments	Seedling Vigour Index (14 DAS)				Mean
	0 month	2 months	4 months	6 months	
Cultivars					
Pe-maungmakaw (V ₁)	2925.33 a	2953.7 a	2623.5 a	2910.7 a	2853.31
Pesau (Yinn-mar) (V ₂)	3505.33 a	2526.8 b	2371.8 ab	2214.4 b	2654.58
Peyi (Thet -yin) (V ₃)	4354.67 a	2437.3 b	2187.4 b	2134.2 b	2778.39
F-test	Ns	*	*	**	
LSD (5%)	-	400.75	335.29	383.56	373.2
CV (%)	-	13.39	12.33	13.98	13.2333
Treatment					
Bottle	-	2829.9 a	2697.4 a	2905.3 a	2810.87
Tin	-	2829.3 a	2416.5 ab	2625.3 a	2623.7
Penan Bag	-	2625.4 a	2356.1 ab	2103.6 b	2361.7
Plastic Bag	-	2272.3 b	2107.0 b	2044.9 b	2141.4
F-test	-	**	*	**	
LSD (5%)	-	279.69	343.14	465.49	362.773
CV (%)	-	13.39	14.47	19.42	15.76

Means with the same letter are not significantly different. **p ≤0.01; *p ≤0.05 ns = non significant.

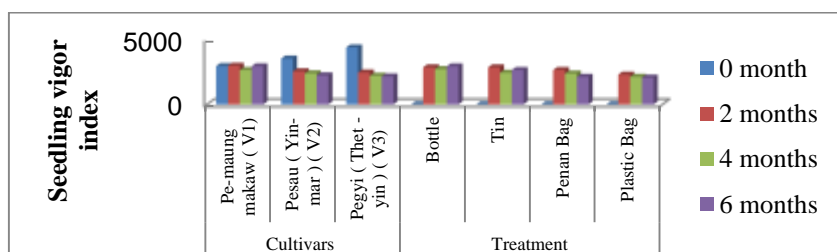


Figure 7 Seedling vigor of three selected lablab bean cultivar after storing room temperature at 14 DAS

Table 15 Significant levels and interaction for seedling vigor of three selected lablab bean cultivars after storing room temperature at 7DAS

Interaction For Factors	2 Months	4Months	6 Months
Cultivar (var)	913674.79 *	575074.43 *	2188635.87**
Treatment (trt)	621923.55 **	529023.3 *	1555538.99**
Var x trt	315673.27 **	146480.90ns	722395.68*

@ values are the mean square for the factor divided by the total sum squares. ** P ≤ 0.01 , *P≤ 0.05 , ns = non significant. cv = lablab bean cultivars, trt= Bottle , Tin , Penan bag and Plastic bag

Correlation Analysis Between the cultivars and Treatments duration of

Seed Storage on Seedling Growth of Three selected Lablab bean cultivars after 2 months

Correlation analysis showed that seedling vigour index (14DAS) had significantly positive correlation with shoot length (7DAS) (r = 0.9547*) at 5% level and root length (14 DAS) (r = 0.9918**) at 1 % level.(Table 16)

Seedling vigour index (7DAS) had significantly positive correlation with germination percentage and survival percentage ($r = 0.9624^*$), shoot length (7DAS) ($r = 0.9892^*$) at 5 % level.

Table 16 Correlation matrix on seedling growth of three selected lablab bean cultivars after 2 months storage

Parameter	Gp%	SVP%	SL (cm) 7DAS	SL (cm) 14DAS	RT(cm) 14DAS	SVI 7DAS	SVI 14DAS
Gp%	1						
SVP%	1						
SL (cm)(7DAS)	0.9137ns	0.9137ns	1				
SL (cm)(14DAS)	0.9984**	0.9984**	0.8961ns	1			
RT(cm) (14DAS)	0.9173ns	0.9173ns	0.9353ns	0.9185ns	1		
SVI (7DAS)	0.9624*	0.9624*	0.9892*	0.9492ns	0.9398ns	1	
SVI (14DAS)	0.8845ns	0.8845ns	0.9547*	0.8801ns	0.9918**	0.9416ns	1

value represents for the r value of correlation relationship, ** =1% level of significant, * =5 % level of significant ns =nonsignificant. Gp=Germination percentage, SVP=Survival percentage, SL= Shoot length, RT= Root length, SVI= Seedling vigour index

Correlation Analysis Between the cultivars and Treatments duration of Seed Storage on Seedling Growth of Three selected Lablab bean cultivars after 4 months

Correlation analysis showed that seedling vigour index (14DAS) had significantly positive correlation with germination percentage and survival percentage ($r = 0.9745^*$) shoot length (7DAS) ($r = 0.9723^*$) at 5 % level. (Table 17)

Root length (14DAS) had significantly positive correlation with germination percentage and survival percentage ($r = 0.9786^*$), shoot length (7DAS) ($r = 0.9681^*$) at 5 % level. Shoot length (7 DAS) had significantly positive correlation with germination percentage and survival percentage ($r = 0.9651^*$) at 5 % level.

Table 17 Correlation matrix on seedling growth of three selected lablab bean cultivars after 4 months storage

Parameter	Gp%	SVP%	SL (cm) 7DAS	SL (cm) 14DAS	RT(cm) 14DAS	SVI 7DAS	SVI 14DAS
Gp%	1						
SVP%	1	1					
SL(cm)(7DAS)	0.9651*	0.9651*	1				
SL(cm)(14DAS)	0.7677ns	0.7677ns	0.8296ns	1			
RT(cm)(14DAS)	0.9786*	0.9786*	0.9681*	0.6814ns	1		
SVI (7DAS)	0.7606ns	0.7606ns	0.8912ns	0.9214ns	0.7530ns	1	
SVI(14DAS)	0.9745*	0.9745*	0.9723**	0.8919ns	0.9298ns	0.8606ns	1

value represents for the r value of correlation relationship, * =5 % level of significant, ns =nonsignificant. Gp=Germination percentage, SVP=Survival percentage, SL= Shoot length, RT= Root length, SVI= Seedling vigour index

Correlation Analysis Between the cultivars and Treatments duration of Seed Storage on Seedling Growth of Three selected Lablab bean cultivars after 6 months

Correlation analysis showed that seedling vigour index (14DAS) had significantly positive correlation with germination percentage ($r = 0.9634^*$), survival percentage ($r = 0.9871^*$) at 5% level, shoot length (7DAS) ($r = 0.9952^{**}$) and seedling vigour index (7 DAS) ($r = 0.9915^{**}$) at 1 % level. (Table 18)

Therefore, results indicated that seedling vigour index (14DAS) had high and positively correlation with germination percentage, survival percentage shoot length (7DAS) and seedling

vigour index (7 DAS). Seedling vigour index (7 DAS) had significantly positive correlation with germination percentage ($r = 0.9578^*$), survival percentage ($r = 0.9868^*$), shoot length (7DAS) ($r = 0.9743^*$) at 5 % level.

Shoot length (7 DAS) had significantly positive correlation with germination percentage ($r = 0.9538^*$) and survival percentage ($r = 0.9747^*$) at 5 % level. Survival percentage had significantly positive correlation with germination percentage ($r = 0.9916^{**}$) at 1% level.

Table 18 Correlation matrix on seedling growth of three selected lablab bean cultivars after 6 months storage

Parameter	Gp%	SVP%	SL (cm) 7DAS	SL (cm) 14DAS	RT(cm) 14DAS	SVI 7DAS	SVI 14DAS
Gp%	1						
SVP%	0.9916**	1					
SL(cm)(7DAS)	0.9538*	0.9747*	1				
SL(cm)(14DAS)	0.9289ns	0.9198ns	0.9579ns	1			
T(cm)(14DAS)	0.9167ns	0.8795ns	0.7575ns	0.7326ns	1		
SVI (7DAS)	0.9578*	0.9868**	0.9743*	0.8804ns	0.818ns	1	
SVI(14DAS)	0.9634*	0.9871*	0.9952**	0.9315ns	0.7920ns	0.9915**	1

value represents for the r value of correlation relationship, ** =1 % level of significant, * =5 % level of significant, ns =nonsignificant. Gp=Germination percentage, SVP=Survival percentage, SL= Shoot length, RT= Root length, SVI= Seedling vigour index

Discussion and Conclusion

This study was carried out to investigate the storage conditions of lablab bean seeds under room temperature for 6 months using the different storage materials such as bottle, tin, penan bag and plastic bag respectively.

According to the results of temperature and relative humidity (RH) during seed storage, the storage room temperature was observed in 23.5 - 32.5°C. The ranges of room RH during seed storage were obtained 69 – 90% during seed storage. Thus, RH was significantly higher in (90)% during seed storage.

This result was in agreement with Canada (2006) who reported that the seeds stored within 85 – 90% RH may lose their germination capacity due to the pathogenic action of molds. Thus seeds were no longer store under high RH. He also described that the temperature is an important abiotic factor governing the condition of pulses in store. In addition, he reported that the optimum temperature for breeding of most insects in storage ranges between 27 - 37 °C and 70% RH.

Coolbear (1995) stated that low storage temperature slows down the rate of aging. In the study, seeds stored in bottles found 90.22% of seed germination after 2 months storage among the cultivars. Among the cultivars, cv. Pemaungmakaw (V₁) observed the highest seed germination percentage 96.67 % after 2 months of storage periods.

However, the rest of the seed storing materials such as tin, penan bags and plastic bags were observed poor seed germination percentage were obtained in the study below 85% seed germination percentages. Therefore, these results were in agreement with Hanson et al. (2006). He also revealed that germination percent should not be below 85% for cultivated species. These results were also in agreement with Genchev (1997) who reported that the poor storage conditions to cause 10% loss in seed quality in the tropics.

After 2 months,4 months and 6 months storage increased shoot length 7 DAS and 14 DAS, seedling vigor index 7 DAS and seedling vigor index 14 DAS were found in cv. pe-maungmakaw (V₁) and decreased in cv. pegyi (V₃). According to the correlation relationship between cultivars

and treatments (different seed storage materials), there were no interaction relationship in seed germination and survival percentages.

However, the result of shoot length, root length and seedling vigor index were observed the significant interaction relationships between cultivars and treatments in this study. Thus, the seedling growth of lablab bean seeds will be increased depending on age of plants. As a result, the increase germination percentage and survival percentage were positively correlated with increase the seedling vigor index.

In conclusion, lablab bean seeds should be stored in bottles for 2 months compared to the others seed storage materials such as tin, penan bags and plastic bags according to this study. After storing of seeds in bottles, seed germination and survival percentages and seedling vigor index were obviously the highest among the cultivars and treatments.

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