https://dx.doi.org/10.4314/afsjg.v14i1.9

Qualitative and Quantitative Assessment of African Eggplant Seed Germination in Relation to Seed Maturation

***H. M. Botey,[1,2] J. O. Ochuodho,[2] L. Ngode[2]**
[1]CSIR - Crops Research Institute, Box 3785, Kumasi, Ghana;
[2]University of Eldoret, Department of Seed, Crop and Horticultural Sciences, 1125-30100, Kenya,

*Corresponding Author: hmireku@gmail.com

Received: 6th June 2021 11th October 2021

Abstract
The final germination expressed as a percentage alone is unsatisfactory for reporting results related to the germination capacity of a seed lot. Information on other quantitative variables are thus important to judge the agronomic value of a seed lot. To evaluate the seed germination characteristics of the African eggplant, seeds were extracted from fruits harvested at different maturity stages produced under both tropical and temperate oceanic climates. The seed germination behaviour was assessed by germinability, germination rate, homogeneity and synchrony of the seed lots. The data for each environment was analyzed separately in a two-way ANOVA constituting harvesting maturity stages and cultivars as factors. The results showed that seed germinability increased with maturation and maximum when fruits were harvested 76 DAA under both climates. Seeds harvested precociously failed to germinate regardless of the production environment. All seed quantitative variables measured were positively related to the final seed germinability. The seed germination rates measurements significantly increased with seed maturity, indicating seed vigour and final germinability improves with maturation. Coefficient of variation of germination time (CVt) was a good measure of uniformity in seed germination. The results further showed a strong and positive correlation with seed germination parameters such as GI, GV, MDG, CVG and U to final germination. It is recommended that for maximum seed quality, fruits should be harvested at 76 DAA. It is further suggested that seed germination results should be enriched by measuring other quantitative parameters as it communicates different aspects of the germination process.

Keywords: Maturation, *Solanum aethiopicum*, Seed germination, Synchronization

Évaluation Qualitative et Quantitative de la Germination des Semences D'aubergines Africaines en Relation Avec la Maturation des Semences

Résumé
La germination finale exprimée en pourcentage seulement n'est pas satisfaisante pour la déclaration des résultats liés à la capacité de germination d'un lot de semences. L'information sur d'autres variables quantitatives est donc importante pour juger de la valeur agronomique d'un lot de semences. Pour évaluer les caractéristiques de germination des graines de l'aubergine africaine, les graines ont été extraites de fruits récoltés à différents stades de maturité produits sous des climats océaniques tropicaux et tempérés. Le comportement de germination des

semences a été évalué en fonction de la germinabilité, du taux de germination, de l'homogénéité et de la synchronisation des lots de semences. Les données pour chaque environnement ont été analysées séparément dans une ANOVA bidirectionnelle constituant les stades de maturité de la récolte et les cultivars en tant que facteurs. Les résultats ont montré que la germinabilité des graines augmentait avec la maturation et au maximum lorsque les fruits étaient récoltés 76 DAA sous les deux climats. Les semences récoltées précocement ne germent pas, quel que soit l'environnement de production. Toutes les variables quantitatives des semences mesurées étaient positivement liées à la germinabilité finale des semences. Les mesures des taux de germination des graines ont considérablement augmenté avec la maturité des graines, ce qui indique que la vigueur des graines et la germinabilité finale s'améliorent avec la maturation. Le coefficient de variation du temps de germination (CVt) était une bonne mesure de l'uniformité de la germination des graines. Les résultats ont en outre montré une corrélation forte et positive avec les paramètres de germination des graines tels que GI, GV, MDG, CVG et vous à la germination finale. Il est recommandé que pour une qualité maximale des graines, les fruits soient récoltés à 76 DAA. Il est également suggéré que les résultats de la germination des graines devraient être enrichis en mesurant d'autres paramètres quantitatifs car ils communiquent différents aspects du processus de germination.

Mots-clés : maturation ; germination des graines; Solanum aethiopicum; synchronisation

Introduction

The African eggplant (*Solanum aethiopicum* L., spp. Gilo) is the third most cultivated and consumed crop in Ghana after tomato and onion (Osei *et al.,* 2010). The seed of this crop however, is reported to possess erratic germination behaviour, which could be attributed to factors such as physiological (embryo) dormancy due to immaturity (Abdoulaye, 1992). Information on the pattern of this germination behaviour is scanty.

Seed germination is one of the crucial stages in plant development and considered a determinant for plant productivity and sustainability. Germination is defined as the process by which the embryo of a quiescent seed imbibes water, which triggers various metabolic processes including mobilization of food reserves and considered complete when there is emergence of the radicle from the seed coat (Bewly, 1997; Hasanuzzaman *et al*., 2013).

The germination capacity of a seed or seed lot is thus based on a binary answer of whether it is germinated or not germinated (Scott *et al.,* 1984). This expression, which is qualitative in nature does not give a broader knowledge of the seed germination behaviour. This is because, germination is considered a qualitative developmental response of an individual seed that occurs at a point in time, but individuals within a treatment responds at different times (Kader, 1998). Thus, the final germination expressed as a percentage alone is unsatisfactory for reporting results related to the germination capacity of a seed lot. It is therefore important to measure other quantitative variables that shows both the seed vigour and germinability in a broader context as these can assist in judging the agronomic relevance and planting value of seed lots.

In this experiment, the seed germination characteristics of the African eggplant (*Solanum aethiopicum* L.) as influenced by harvest maturity were studied for two cultivars produced under both tropical and temperate oceanic climates. Additionally, the relationships of these parameters with each other were measured to provide a better understanding of the germination pattern of this crop.

Materials and Methods

(i) Plant Materials

The experiment was conducted on two cultivars of African eggplant (cv. *Oforiwa* and cv. *Kpando*). Flowers were tagged at anthesis and fruits were harvested at different maturity stages (20, 34, 48, 62, 76 and 82 days after anthesis, DAA). Seeds were then extracted from fruits at the various maturity stages and shade dried for 48 hours under ambient conditions (24 ± 3 °C) until moisture content was between 10 and 11.5%.

The seeds were produced under a tropical climate located in Bungoma County, Kenya at N00° 36.222´E034° 37.392´ and University of Eldoret Agriculture Research Field, Chepkoliel in Uasin Gishu County (N00° 34.468´ E 035° 18.044´) classified as temperate oceanic climate between May 2019 and January 2020. The seed lots were under cold storage prior to germination tests. All germination tests were carried out at the Seed physiology laboratory of the Department of Seed, Crop and Horticultural Sciences, University of Eldoret, Kenya.

(ii) Determining seed quantitative of seed lots.

(A) Measurement of seed germination capacity:

Seeds were subjected to germination tests in a germination incubator (Biobase: BJPX-B400II) at 30/20 °C with 8/16 hours of light and dark period for 14 days according to Botey *et al*., (2021a). The seed tests were uniform for all seed lots. Tests were performed by placing four replicates of 50 seeds on two sheets of moistened Blotter (PRAT DUMAS) placed in 90 mm petri dishes. Seed germination was observed and counted daily for 14 days. Seeds were considered germinated when there was a minimum of 2 mm protrusion of the radicle. Germinability (G %) was calculated on the total number of seeds germinated (radicle protrusion) against the total number of seeds sown as a percentage.

(B) Measurement of germination rate:

The seed germination rate of seed lots were measured by coefficient of velocity of germination, Germination index, Mean germination rate, Peak value and germination value according to the equations below:

1. Coefficient of Velocity of Germination:

CVG = N1 + N2 + · · · + Nx/100 × N1T1 + · · · + NxTx. ——— 1

Where:
N = No. of seeds germinated each day,
T = No. of days from seeding corresponding to N, according to Jones and Sanders (1987)

2. Germination Index:

GI = (10×n1) + (9×n2) + · · · + (1×n10) n1, n2 . . . n10 = No. of germinated seeds on the first, second and subsequent days until the 10th day; 10, 9 . . . and 1 are weights given to the number of germinated seeds on the first, second and subsequent days respectively according to Bench Arnold *et al.,* (1991) ——— 2

3. Mean germination rate (MGR):

$$MGR = \frac{\text{number of germinated seeds}}{\text{days to first count}} + ... + \frac{\text{number of germinated seeds}}{\text{days to final count}}$$

according to Maguire, (1962) 62). ——— 3

4. Mean daily germination (MDG):
It was calculated by the formula according to Czabator (1962) as:

$$MDG = \frac{\text{total number of germinated seeds}}{\text{total number of days}} \qquad 4$$

5. Peak value (PV):
This was calculated by the following formula given according to Czabator (1962) as:

$$PV = \frac{\text{highest seed germinated}}{\text{number of days}} \qquad 5$$

6. Germination value (GV):
Germination value was calculated by the formula according Czabator (1962) as:

$$GV = PV \times MDG \qquad 6$$

C. Measurements of uniformity of germination

The uniformity of seed germination of the seed lots was measured by the Coefficient of variation of germination time (CVt) using the formula according to Ranal and Santana (2006) as:

$$Cvt = \left(\frac{St}{tm}\right) x\ 100 \qquad 7$$

where:
Cvt = coefficient of variation of the germination time, %; s_t: standard deviation of germination time, days; and t_m: mean germination time, days.

A. Measurements of germination synchrony:

The germination synchrony of the seed lots was measured by the synchronization index (U) and degree of germination overlaps (Z) according to the formula by Ranal & Santana, (2006).

(i) Correlation dynamics among the seed quantitative parameters

The correlation dynamics among the seed quantitative traits were measured by Pearson correlation using Statistical Tool for Agricultural Research (STAR).

Experimental design and analysis.

The experiment was laid in a 2 x 5 factorial CRD. Factor on constituted cultivars at two levels while factor two comprised harvest maturity stages at five levels. In each environment, the effect of harvesting maturity stages on the parameter measured were analyzed in a two-way ANOVA in a completely randomized design. Each measurement was made in four replicates. Values expressed in percentages were arcsine transformed before subjecting to statistical analysis. Data were checked for normality of residual distribution and variance homogeneity by Shapiro-Wilk test. Treatment means were compared by Tukey HSD test at 5% probability level using Statistical Tool for Agricultural Research (STAR).

Results and Discussion

Influence of harvest maturity on germinability (G %) of seed lot produced under tropical and temperate oceanic climates.

The influence of harvest maturity stage on percentage seed germination varied significantly ($p < 0.01$) at both seed production environments (Fig. 1A and B). The germination behaviour also differed among the cultivars. In the early stages of development, no germination occurred for seeds produced under a tropical climate (A) for cv. *Kpando* while <10 % germination was recorded for cv. *Oforiwa*. Germination then increased sharply in fruits harvested 48 DAA and was maximum (100%) for both cultivars at 76 DAA and maintained or marginally declined thereafter (Fig. 1A). Fruits harvested at early stages (20 and 34 DAA) from the temperate oceanic climate (B), however failed to germinate for both cultivars until the third stage of harvest (48 DAA). Later harvests recorded a steady increase in percentage germination until it reached a peak of 98% at 76 DAA and slightly declines afterwards (Fig. 1B).

The maximum percentage germination coincided with the physiological maturity (PM) (i.e. maximum dry seed weight) for cv. *Kpando* at 76 DAA while PM of cv. *Oforiwa* occurred 14 days earlier. The observed results is consistent with that of Martins *et al.,* (2012)

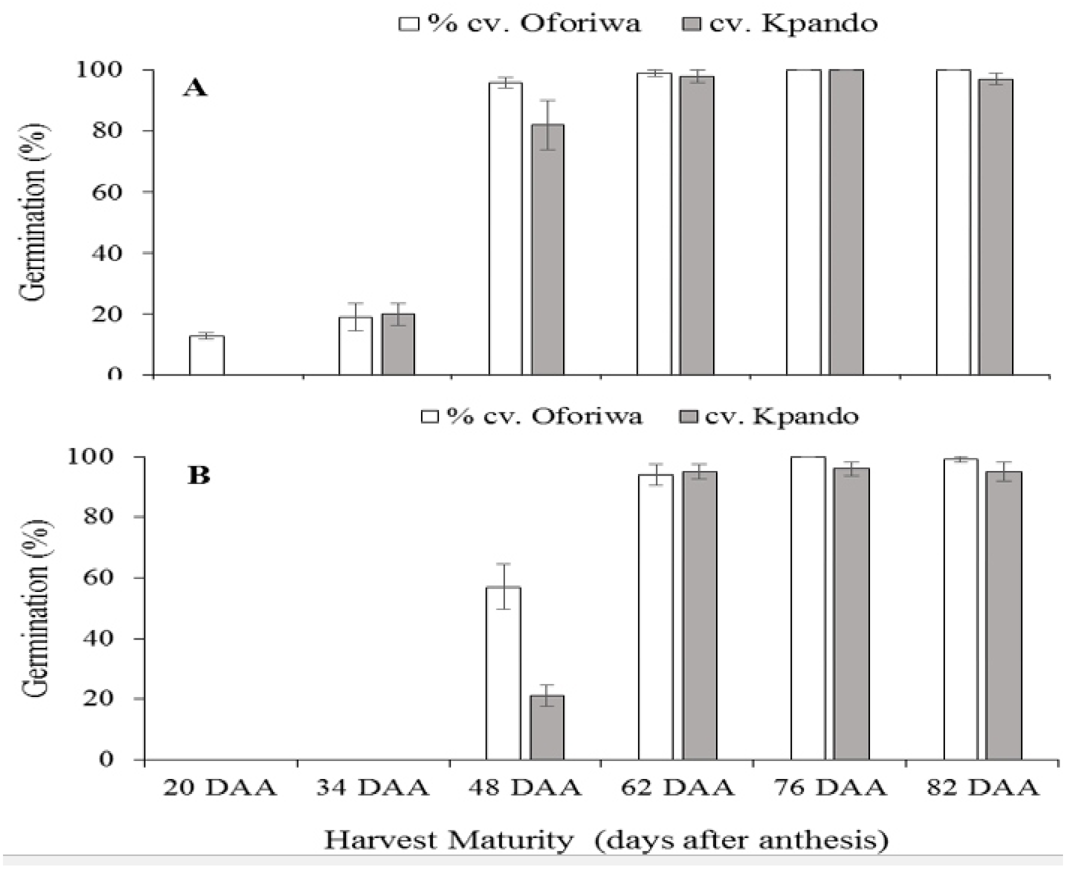

Figure 1A & B: Seed germinability (G %) of cv. *Oforiwa* and cv. *Kpando* obtained from fruits harvested at different maturity stages and produced under tropical climate (Fig. 1A) and temperate oceanic climate (Fig. 1B) (vertical bars are ± standard error of means, SEM).

for eggplant that the best period to harvest is 70 days after pollination. Oliveira *et al*. (1999) and Silva et al., (2015) also reported similar results for pepper (*Capsicum annuum* L.) and Berry-like pepper (*Capscium baccatum* L.) respectively, that best seed quality was from fruits harvested between 60 and 70 DAA. Demir and Ellis (1992a) and Valdes and Gray (1998) also reported 75 DAA for tomato as best time to harvest fruits for maximum germinability.

Harrington (1972) hypothesized that maximum seed quality is attained at physiological maturity (PM), after which deterioration starts and seed germination declines. This has been proven true for cv. *Kpando* in this study and other fleshy fruited crops such as Okra (Demir and Ermis, 2005; Bortey and Dzomeku, 2016). Vigidal *et al*. (2011) also reported same results for sweet pepper where maximum germination and seed vigour coincided with mass maturity or physiological maturity at 75 DAA.

On the contrary, maximum seed germination was attained 14 days after physiological maturity (PM) for *cv. Oforiwa*. This characteristic is consistent with the views by (Ellis & Filho, 1992b) and later by TeKrony and Egli (1997) that some fleshy fruited species such as tomato, pepper and eggplant attain maximum germinability sometime after the seed-filling stage or PM. In tomato, maximum seed quality was attained more than 20 days after the maximum dry matter content (Demir and Ellis, 1992a). The results also corroborates similar observations for eggplant (Demir *et al*., 2002) and pepper seeds (Oliveira *et al*., 1999). This observation suggests that even within the same species, seed development and germination behaviour could vary regarding the occurrence of maximum germinability.

Effect of harvest maturity stage of seed lots on seed germination rate measurements.

The measurements of germination rate are quantitative traits that can inform the dynamics of the germination process among seed lots in relation to seed vigour and its ability to develop into a normal seedling. The results showed a significant difference ($p < 0.01$) in harvest maturity stage on the parameters characterizing germination rate of seed lots from both climates (Table 1 and 2). With the exception of germination index (GI), all other parameters measured were however not significantly different between the two cultivars and their interactions with harvest maturity at $p < 0.05$ significance level. Thus, the results presented and discussed represent means of the two cultivars and how seeds extracted at different maturity stage influenced these quantitative traits.

Although, maximum germinability (Fig. 1) as influenced by harvest maturity occurred 76 DAA, the maximum values for germination rate parameters as an indication of seed vigour were observed 7 days after (82 DAA) as shown in Tables 1 and 2. The values were however, not statistically different from the mean values at 76 DAA.

Mean germination rate (MGR) increased with seed maturation with the highest value (0.180 and 0.179) occurring 82 DAA and did not differ under both climates. Since, MGR measures the speed of germination and quantifies the seedling vigour (Czabator, 1962), the results show that higher seed vigour is obtained from seeds extracted from latter harvests (76 or 82 DAA) than earlier harvests. It is worth noting that this measure did not vary regardless of the seed production environment. Mean daily germination (MDG) on the other hand gives an indication of number of seeds germinating per day. More

Table 1: Parameters characterising germination rate of seeds lots as influenced by harvest maturity stage and produced under tropical climate.

Harvest Maturity	MGR (day^{-1})	MDG	CVG (%)	GI	GV	PV (day^{-1})
34 DAA	0.105 c	1.02 c	10.51 c	0.63 c	2.10 c	1.83 c
48 DAA	0.139 b	4.23 b	13.94 b	3.32 b	40.51 b	9.42 b
62 DAA	0.156 ab	4.68 a	15.63 ab	4.09 ab	54.76 a	11.65 ab
76 DAA	0.164 ab	4.76 a	16.45 ab	4.40 a	58.87 a	12.36 a
82 DAA	0.180 a	4.68 a	18.09 a	4.83 a	64.08 a	13.64 a
Mean	0.149	3.87	14.92	3.45	44.06	9.78
SEM	0.05	0.1	0.72	0.18	3.41	0.66

Note: MGR: Mean germination rate; MDG: Mean daily germination; CVG: Coefficient of velocity of germination; GI: Germination index; GV: Germination value; PV: Peak value; SEM: standard error of means. Means followed by same letters in each column are not significantly different based on the Tukey's HSD test at 0.05 probability.

Table 2: Parameters characterising germination rate of seeds lots as influenced by harvest maturity stage and produced under temperate oceanic climate.

Harvest Maturity	MGR (day^{-1})	MDG	CVG (%)	GI	GV	PV (day^{-1})
48 DAA	0.109 b	2.78 b	10.96 b	1.24 c	13.15 c	3.55 c
62 DAA	0.129 b	6.75 a	12.94 b	3.34 b	61.23 b	9.01 b
76 DAA	0.166 a	6.92 a	16.64 a	4.48 a	84.94 a	12.14 a
82 DAA	0.179 a	6.99 a	17.95 a	4.72 a	93.46 a	13.46 a
Mean	0.146	5.86	14.62	3.45	63.19	9.54
SEM	0.07	0.16	0.54	0.17	3.97	0.51

Note: MGR: Mean germination rate; MDG: Mean daily germination; CVG: Coefficient of velocity of germination; GI: Germination index; GV: Germination value; PV: Peak value; SEM: standard error of means. Means followed by same letters in each column are not significantly different based on the Tukey's HSD test at 0.05 probability.

seeds (4 to 6) were germinating per day from seed lots obtained at PM. This suggests that as seeds matures, the number of seeds germinating per day increases, which is another good indicator of seed vigour.

Coefficient of velocity of germination (CVG) according to Jones and Sanders (1987) gives an indication of rapidity of germination. CVG values increases when the number of germinated seeds increases and the time required to germination decreases (Busso *et al*., 2005). From the present results, it has been established that CVG is influenced by seed maturation, suggesting that as seed matures, less time is required for it to germinate and at a faster rate. This is due to the increase in seed dry matter content which gives the seed more energy. Martins *et al.,* (2012) observed similar results for eggplant where seeds harvested between 63 and 70 days after pollination germinated faster than earlier harvests. This measure is a good indicator of both seed vigour and germinability of a seed lot.

Germination index (GI) increased with maturity stage and the highest index (4.83) occurred from seeds extracted from fruits harvested 82 DAA but not significantly different from those harvested 76 DAA. The lowest index (0.63) was observed in seeds extracted from earlier harvests (34 DAA). GI combines both germination percentage and speed of germination (Bench-Arnold *et al.,* 1991; Kader, 2005) and thus serve as a good measure of seed vigour and germinability of a seed lot. Vidigal *et al.,* (2011) using speed emergence index (SEI) as an indicative measure of vigour also reported maximum SEI values when seeds were extracted from pepper fruits harvested from 60 DAA to 75 DAA.

Germination value (GV) increased with seed maturation with the highest value (64.08) occurring at 82 DAA for seed lots produced under tropical climate (Table 1) and 93.46 for seed lots produced under temperate conditions (Table 2). GV as proposed by Czabator (1962) provides a single measure to capture both speed and completeness of germination. This suggest that GV is also a good measure to predict the seed vigour of the seed lots, taking into account the speed and ability to complete the germination process.

Peak Value (PV) was significantly influenced by harvest maturity as it increased with maturation. Higher peak values indicate seed lots with higher speed and germinability and this was observed in seeds extracted at 76 and 82 DAA. Peak value (PV) represents the maximum cumulative germination percentage divided by the number of days to reach this percentage (Brown and Mayer, 1988).

The results of the present study showed that MGR, MDG, CVG, GI, GV and PV are good parameters to classify the vigour and germinability of seed lots. The observation of seed vigour parameters occurring after physiological maturity (76 DAA) is consisted with the reports by Tekrony and Egli (1997). In their study, maximum seed vigour for pepper (*Capsicum spp.*) and tomato (*Lycopersicon esculentum* Mill.) occurred 6 and 10 days respectively after PM. GI and CVG measurements give maximum weights to the time when majority of seeds in a lot germinates, hence, these measurements can further assist in estimating the timing of cultural practices following sowing (Kader, 1998) and the stress resistance of the seed lots (Kader and Jutzi, 2002).

Effect of harvest maturity stage of seed lots on seed uniformity of germination measurements.

The germination dispersion over time expressed by the coefficient of variation of time (CVt) as a measure of uniformity in seed germination was not significantly different for both cultivar and harvest maturity levels (Fig.2). However, the CVt values were slightly higher for seed lots produced under temperate oceanic climate than those produced under tropical climates (Fig. 2B).

The CVt measurement was proposed to evaluate the germination uniformity or

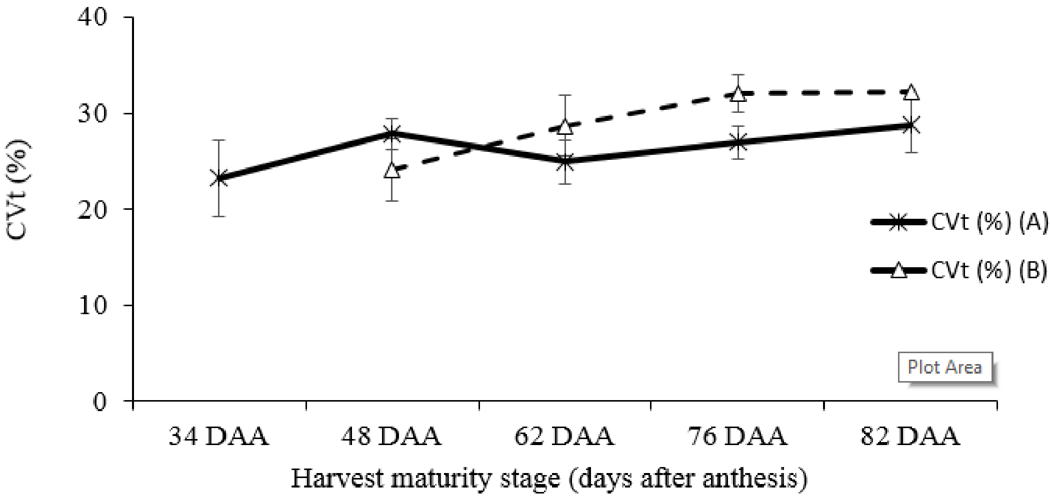

Figure 2: Effect of harvest maturity stage on coefficient of variation of germination time (CVt) as a measure of uniformity of seed germination of seed lots produced under tropical (CVt, Fig. 2A) and temperate oceanic (CVt, Fig. 2B) climates. Bars represent standard error of means (SEM)

variability in relation to mean germination time (Dorneles *et al.,* 2005; Ranal & Santana 2006). The low values of CVt (23.2 to 32 %) recorded among the seed lots showed that the germination of seeds was homogeneous. In terms of the seed production conditions, it can be deduced that seeds produced under the tropical climates possess more homogenous germination pattern compared to those produced under the temperate oceanic climate. Tropical climates had relatively higher temperatures which promotes growth and development of fruits and seeds inside. This suggests a possibility of more food reserve accumulation in these seeds lots. Similar CVt values were observed in *Baccharis trimera* (Less.) var. CPQBA-1 seeds (Moreno-Pizani *et al.*, 2019).

Effect of harvest maturity stage of seed lots on seed synchronization measurements.

The parameters measured to characterize the germination synchronization were not significantly different among the different maturation stages (p = 0.30 (z); 0.65 (u)) for seed lots produced under tropical climates. There was however, a significant difference ($p < 0.05$) among seed lots from the temperate climates (Table 3).

The mean of the uncertainty (U) value was far from zero ($U \geq 2.13$) and less than one (≤ 0.21) suggesting that seed germination occurred well-distributed in time. It was however, observed that seeds extracted from earlier harvests (34 DAA under tropical climate and 48 DAA under temperate climate) were more synchronous (low synchronization index) and had a low degree of germination overlaps indication homogeneity. Later harvests seed lots had higher synchronization index (U) and higher values for germination overlaps (Z), suggesting that as seeds of *Solanum aethiopicum* for these cultivars matures, they tend to be more asynchronous. That is showing physiological heterogeneity and this

Table 3: Parameters characterizing germination synchrony of seeds lots as influenced by harvest maturity stage.

Harvest Maturity	U (bit)	Z	U (bit)	Z
34 DAA	1.74	0.16	**	**
48 DAA	2.24	0.24	2.04 b	0.16 ab
62 DAA	2.27	0.21	2.64 a	0.14 b
76 DAA	2.24	0.20	2.38 ab	0.19 ab
82 DAA	2.14	0.25	2.19 b	0.22 a
Mean	2.13*	0.21*	2.31	0.18
SEM	0.13	0.02	0.09	0.03

Note: U: Synchronization index; Z: degree of germination overlaps, SEM: standard error of means; *: means were not significantly different among the harvest maturity stages. **: No germination occurred at maturity stage.

could explain their erratic seed germination behaviour.

Correlation dynamics among the seed quantitative parameters as a function of harvest maturity stage.

Table 4 illustrates a multivariate correlation analysis depicting the relationships that exist among the seed quantitative measurements. Mean daily germination (MDG), Coefficient of velocity of germination (CVG), Germination value (GV) and Germination index (GI) and synchronization index (U) significantly and strongly correlated with germinability of seeds lots (G %) ($p < 0.001$). Coefficient of variation of germination time (CVt) was however not significantly related to seed germinability (G %) (Table 4).

Mean daily germination measures the number of seeds germinating per day, which gives an indication of seed vigour. The higher the value of MDG, the more vigorous the seed lot and that explains its high correlation with final germination percentage. According to Kader (2005), coefficient of velocity of germination, CVG measurement does not focus on final germination percentage but places emphasis on time required to reach it. The author concludes that CVG measurements may not be very useful to represent the overall seed germination activity. In this experiment however, CVG has shown to be highly and strongly correlated to final germination percentage (G %). This could be explained by the fact that CVG is a reciprocal of mean germination time (Ranal and Santana, 2006) and mean germination time was strongly correlated with germination percentage as a function of seed maturation (Botey *et al.,* 2021b). This suggests that as African eggplant seed matures, the time required to complete germination process (MGT) reduces. Thus, for seed maturation studies, CVG measurement could be useful as it gives an indication of the rapidity of seed germination process.

Germination index correlate strongly with final germination percentage because it measures both the germination percentage and speed of the germination process; taking into account the spread and duration of germination. As reported by Kader (2005), this index is accurate in measuring seed germination behaviour. Another important parameter that could explain further the germination behaviour of seed lots is the germination value (GV) proposed by Czabator (1962). This value combines the effect of mean daily germination and peak value. The peak value represents the maximum cumulative germination percentage against the numbers of days to reach this percentage. Brown and Mayer (1988) explains GV, expresses both the speed and totality of germination and their interaction and that explains its strong positive correlation with final germinability of seed in this study. The synchronization

Table 4: Correlation dynamics among the seed quantitative parameters as a function harvest maturity for seed lots produced under tropical climate.

	G (%)	MDG	CVG	GI	GV	Cvt	U
G (%)	-						
MDG	1.000**	-					
CVG	0.900*	0.900	-				
GI	0.973*	0.973*	0.976*	-			
GV	0.970*	0.970*	0.977*	0.999**	-		
CVt	0.747ns	0.747ns	0.766ns	0.773ns	0.746ns	-	
U	0.962*	0.962*	0.748	0.874*	0.871*	0.644ns	-

G (%): Germinability; MDG: Mean daily germination; CVG: Coefficient of velocity of germination; GI: Germination index; GV: Germination value; CVt: Coefficient of variation of germination time; U: synchronization index. Significance: ** < 0.001 * < 0.05; ns: not statistically significant.

index (U) also correlated with germination percentage. While this index measures the degree of spread of germination through time and by inference the measure of synchrony of germination (Ranal and Santana, 2006), it is a binary measure. It depicts whether a seed has germinated or not germinated, thus, once there is germination occurring, it is likely to give a positive correlation with germination. Ranal and Santana (2006) reported that U, is not associated with Coefficient of variation of germination time (CVt) and this is consistent with the results of this study.

The coefficient of variation of germination time (CVt) was not correlated with final germination percentage (G %). This is because CVt measures the germination uniformity or variability in relation to the mean germination time. CVt can only be measured when at least two seeds are able to complete the germination process at different times (Ranal and Sanata, 2006), hence may not necessarily give a better representation of the final germinability of the seed lot.

Conclusions

The present study showed that seed germinability increased with maturity and maximum when seeds are extracted from fruits harvested 76 days after anthesis. Values of seed quantitative parameters measured increased with seed maturation indicating that seed vigour and germinability improves with maturity. The results further showed a strong correlation of the seed germination parameters measured with final germinability of seed lots. These measurements have proven to be useful for studying the seed germination behaviour of the African eggplant seed lots in relation to harvest maturity.

Acknowledgement

We acknowledge the funding support from the Intra-Africa Academic Mobility Scheme of the European Union under the Scientists in Crop Improvement for Food Security in Africa (SCIFSA) program.

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