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Research Article
Seed Germination and Seedling Characteristic of *Ipomoea* and *Merremia* (Convolvulaceae) in Lambayeque (Peru)

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Abstract
Background and Objective: Studies were undertaken to determine the effects of *in vivo* germination of mechanically scarified with and without sandpaper, chemically scarified with H_2SO_4 for 40 min and without H_2SO_4 and *in vitro* germinated with sandpaper and with sandpaper and GA_3 seeds of *Ipomoea* and *Merremia* in the Lambayeque region and surrounding areas (Peru). **Materials and Methods:** Seeds of 16 species of *Ipomoea* and 3 species of *Merremia* collected from Lambayeque (Peru) were germinated under *in vivo* and *in vitro* conditions and measured the angle of divergence of seedlings and the data were analysed by ANOVA. **Results:** In the *in vivo* germination process, mechanical and chemical scarification caused an increase in germination and in the *in vitro* germination process mechanical scarification with sandpaper and GA_3 also caused an increase in germination. Seedling emergence was observed and recorded and found not to fit the classical models of hypogeal and epigeal emergence and in the seedling morphology the degree of apical cleft of paracotyledonary leaves and the angle of divergence between the two lobes of a paracotyledon were determined. The length of the apical cleft was highly correlated (r = 0.81) with the angle of divergence. **Conclusion:** Convolvulaceae is the most advanced family that produces seeds with physical dormancy (water-impermeable seed coat).

Key words: *Ipomoea*, *Merremia*, scarification, seed germination, seedling characteristic

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Convolvulaceae family has a cosmopolitan distribution, with about 56 genera and 1600 species. Most members of the Convolvulaceae consist of herbaceous vines but the family also contains species of trees, shrubs and woody vines (lianas)[1]. In most systems, Convolvulaceae has been included in the order Solanales[2,3].

Austin[4] proposed a phylogenetic scheme of genera in the Convolvulaceae using morphological, anatomical and physiological characteristics and sub-divided the Convolvulaceae into 10 tribes: Convolvuloideae , Merremieae, Argyreieae, Ipomoeeae, Poraneae, Erycibeae, Hildebrandtieae, Cresseae, Dichondreae and Cuscuteae. However, Stefanovic *et al.*[5] derived the phylogenetical relationships of the family using molecular data and their taxonomic scheme included 12 tribes: Ipomoeeae, Merremieae, Convolvuleae, Aniseieae, Cuscuteae, Jacquemontieae, Maripeae, Cresseae, Dichondreae, Erycibeae, Cardiochlamyeae and Humbertieae.

The genus *Ipomoea*, with approximately 500-600 species, comprises the largest number of species within the Convolvulaceae, these species are mainly distributed throughout the South and Central American countries and Tropical Africa territories[6]. One of the most noticeable anatomical characteristics of the Convolvulaceae is the existence of cells, which secrete resin glycosides in the foliar tissues and in the roots of the plants, however, alkaloids, phenolics compounds and glycolipids are also the most common biologically active constituents from these plant extracts[7]. Some of these species showed antimicrobial, analgesic, spasmolytic, spasmogenic, hypoglycemic, hypotensive, anticoagulant, anti-inflammatory, psychotomimetic and anticancer activities[7].

On the other hand, *Merremia* is a genus of flowering plants also in the morning glory family, Convolvulaceae, commonly known as wood roses. More than 200 species have been described in the world, however, only around 70 have been accepted[1]. A chemotaxonomic study leads to 3 groups of sections, some taxa free of tropanes, some taxa with simple tropanes and some taxa with merresectines in addition to simple tropanes[8]. In traditional medicinal system, different species of *Merremia* have been used, highlighting widely *Merremia emarginata* (*M. emarginata*). This specie has been mentioned to be therapeutically used as deobstruent, diuretic, for the treatment of cough, headache, neuralgia and rheumatism, further showing promising biological activities for instance, the methanolic extract of this plant might be fully used for its antioxidant and anti-obesity activities with minimal toxicity[9]. In this species, the ethylacetate fraction of the whole plant was found to be cytotoxic against human cervical carcinoma Hela cell lines and human breast carcinoma MCF cell lines[10]. Likewise, in *M. emarginata* the presence of tannins, flavonoids, amino acids, starch, glycosides and carbohydrates in the different leaf extracts was established and the methanolic extract was more effective against *Bacillus cereus* and *Escherichia coli*, whereas, the aqueous extract was more effective against *Staphylococcus aureus* and *Pseudomonas aeruginosa*[11].

In the germination process, dormancy caused by a water impermeable seed (or fruit) coat (i.e., physical dormancy, PY) is known to occur in 16 angiosperm families but no gymnosperms[12]. Convolvulaceae is the only family in the highly evolutionarily advanced euasterid clade[13], whose seeds have PY[14]. A palisade layer (s) in the seed (or fruit) coat is (are) responsible for this impermeability to water[15]. Water enters the seed when the "water gap" (a special morpho-anatomical area in the seed coat) is open[16]. The seed becomes permeable to water when an opening is formed via a specialized anatomical structure ('water gap') in the palisade layer (s), allowing water to enter the seed[17]. In this regard, the morphology and anatomy of physical dormancy in *Ipomoea lacunosa* with the identification of the water gap in seeds of Convolvulaceae (Solanales) were studied[16]. In this species, Gomes *et al.*[18] tested the effect of scarification on germination and found that scarified seeds generally germinated to significantly higher percentages across a range of temperature than the non-scarified ones, however, in opinion of Jayasuriya *et al.*[16] suggested but does not prove, that seeds of *Ipomoea lacunosa* are water impermeable. They did not compare the water uptake (imbibition) in scarified versus non-scarified seeds and scarification can break dormancy in seeds with shallow physiological dormancy as well as in those with PY[16].

There are several ancient studies that have attempted the identification of the route of water entry into the seeds of Convolvulaceae, however, none of these studies clearly documented a water gap[16]. For instance, the blocking method (lanolin-petroleum jelly), which investigates in what way water entered seeds of *Cuscuta campestris* that had been scarified with concentrated H_2SO_4 was employed[19].

On the other hand, in bio-systematics, mature morphological features are the conventional criteria used to establish taxonomic status, however, seedling morphologies are too early developmental stages to show an appropriate stability[20]. In addition, morphological and biochemical investigations on *Ipomoea* seedlings and their species inter-relationships were determined[21]. Likewise, the effect of canopy gaps on growth and morphology of seedlings of ten tropical rain forest species were studied and most species showed a complex growth response in which they resemble the shade intolerant extreme in some aspects of the response and the shade tolerant extreme in other aspects[22]. In another study, the developmental anatomy of cultured seedlings of 3 species with foliose roots and 6 related species with ribbon-like or flattened sub-cylindrical roots in the Asian and Australian Podostemaceae was described[23]. In other species as *Vigna adenantha*, *V. candida*, *V. caracalla* and *V. luteola*, the type of germination, the thigmotropic movement of the hypocotyl and of the stem, the seedling architecture and plant longevity were recorded and these traits allowed us to differentiate the species and construct an identification key that could be useful for agronomic or floricultural purposes[24]. In general, the results obtained will allow the establishment of protection standards for the species under study, from their seedling status, which will contribute to their conservation, likewise, it can also be used as basic protocol for other species under field conditions.

In the present work, seed germination and seedling characteristic in some taxa of *Ipomoea* and *Merremia* in Lambayeque region and surrounding areas (Peru), were studied, which will allow the conservation of *ex vitro* and *in vitro* germplasm and the identification of seedlings in the field.

MATERIALS AND METHODS

Plant material: Sixteen species of *Ipomoea* and 3 species of *Merremia* collected from different parts of the Lambayeque region and surrounding areas (Peru) included 16 wild species: *Ipomoea alba* L., *I. amnicola* Morong, *I. aristolochiaefolia* G. Don, *I. asarifolia* (Desr.) Roem and Schult., *I. cairica* (L.) Sweet, *I. carnea* Jacq., *I. dumetorum* Willd. ex Roem. and Schult, *I. hederifolia* L., *I. incarnata* (Vahl) Choisy, *I. nil* (L.) Roeth, *I. parasitica* (Kunth) G. Don, *I. piurensis* O'Donnell, *I. quamoclit* L., *I. tiliacea* (Willd.) Choisy, *I. wrightii* A. Gray, *Merremia aegyptia* (L.) Urb., *M. quinquefolia* (L.) Hallier f., *M. umbellata* (L.) Hallier f. and one cultivated species: *I. purpurea* (L.) Roth (ornamental species)[25].

Seed collection: Seeds were collected from numerous plants of 16 species of *Ipomoea* and 3 species of *Merremia* collected from different parts of Lambayeque region and surrounding areas (Peru) from July-October, 2013, without finding reports on the subject. These seeds were pooled and store in plastic bags under ambient room conditions (22-26°C and 60-80% RH) until used. Experiments were carried out within 2 months of collection.

Germination: *In vivo* germination tests of mechanically scarified with sandpaper and non-scarified (control) and chemically treated with H_2SO_4 for 40 min and non-chemically treated with H_2SO_4 (control) seeds were conducted in both light/dark (12/12 h) (approx. 50 mmol m^{-2} sec^{-1}, with cool white fluorescent light) and daily temperature regimes of 22-24°C. Seeds were incubated in 9.0 cm diameter petri dishes on Whatman moist filter paper. Three replicates of 15 seeds were used for each treatment. The number of germinated seeds was counted every 5-7 days for 21 days. *In vitro* germination tests of mechanically scarified with sandpaper and mechanically scarified with sandpaper and gibberellic acid (GA_3) seeds were conducted in MS culture medium[26] supplemented with the vitamins myo-inositol 100 mg L^{-1} and thiamine. HCl 1.0 mg L^{-1}, 3% sucrose, 0.5 mg L^{-1} GA_3 and 0.6% agar. A seed is considered germinated when the radicle measured double the size of the seed. Germination percentages of non-treated and of mechanically and chemical scarified seeds were compared to determine if seeds have physical dormancy.

Morphological characterization of seedlings: The 2 morphological features of seedlings measured were the degree of apical insertion and the angle of divergence between the two lobes of bilobed paracotyledonary leaves in 2 weeks old seedlings. Measurements were made on 15 seedlings for each species. This methodology was described by Das and Mukherjee[21] in the study of morphological and biochemical investigations on *Ipomoea* seedlings and their species inter relationships.

Analysis of data: Results were processed and analyzed by analyses of variance (ANOVA) and the Duncan's multiple range test ($p \leq 0.05$) in order to compare treatment means, using Word and Excel programs for Windows, version 2010.

RESULTS

Breaking dormancy and germination: In both *Ipomoea* and *Merremia* species, in the *in vivo* imbibition process, the mass of treated (both mechanically scarified with sandpaper or chemically scarified with H_2SO_4 for 40 min) seeds increased more than 100% in 24 h. In this time all of them were fully imbibed, whereas, that of non-treated (non-scarified) seeds only increased about 1% (data not shown).

In the *in vivo* germination process (Table 1), the germination percentages of non-treated seeds (neither sandpaper nor H_2SO_4 were employed) were very low (<35%) as *Ipomoea cairica*, *I. carnea*, *I. nil*, *I. wrightii* and *Merremia*

Table 1: *In vivo* germination and coefficient of germination velocity (CGV) seeds of *Ipomoea* and *Merremia* on moist filter paper at room laboratory temperature (22-24°C)

	Treatments (Scarification)							
	Mechanical				Chemical			
	With sandpaper		Without sandpaper (Control)		With H_2SO_4, 40 min		Without H_2SO_4 (Control)	
Species	Germination (%)	CGV	Germination (%)	CGV	Germination (%)	CGV	Germination (%)	CGV
Ipomoea alba	90	1.24	60	0.59	60	0.53	60	0.59
I. amnicola	63	0.94	20	0.21	00	0.00	00	0.00
I. aristolochiaefolia	60	0.77	40	0.56	00	0.00	40	0.56
I. asarifolia	100	1.39	40	0.39	100	0.96	40	0.39
I. cairica	30	0.41	00	0.00	30	0.41	00	0.00
I. carnea	83	1.21	00	0.00	10	0.02	00	0.00
I. dumetorum	80	1.06	20	0.24	80	1.09	20	0.24
I. hederifolia	100	1.42	20	0.24	100	1.36	20	0.24
I. incarnata	100	1.33	100	0.76	100	0.82	100	0.76
I. nil	100	1.35	00	0.00	00	0.00	00	0.00
I. parasitica	70	0.96	20	0.32	40	0.33	20	0.32
I. piurensis	100	1.36	80	0.71	20	0.14	80	0.72
I. purpurea	40	0.58	100	1.32	50	0.67	100	1.32
I. quamoclit	10	0.02	60	0.97	40	0.36	60	0.97
I. tiliacea	100	1.33	20	0.29	67	0.94	20	0.29
I. wrightii	50	0.67	00	0.00	50	0.46	00	0.00
Merremia aegyptia	25	0.41	10	0.12	29	0.23	10	0.12
M. quinquefolia	100	1.32	10	0.09	90	1.21	10	0.09
M. umbellata	20	0.27	00	0.00	60	0.50	00	0.00

umbellata with 0% and *M. aegyptia*, *I. amnicola*, *I. dumetorum*, *I. hederifolia*, *I. parasitica*, *I. tiliacea* and *M. quinquefolia* with 10-20%, moderately high (35-70%) as *I. alba*, *I. aristolochiaefolia*, *I. asarifolia* and *I. quamoclit* and very high (>70%) as *I. incarnata*, *I. piurensis* and *I. purpurea*. The coefficient of germination velocity (CGV) was 1.32 (100% of germination) as *I. purpurea* and 0.0 (0% of germination) as *I. cairica*, *I. carnea*, *I. nil*, *I. wrightii* and *M. umbellata*.

The germination percentages of mechanically treated seeds (with sandpaper) were very low as *I. cairica*, *I. quamoclit*, *M. aegyptia* and *M. umbellata* (10-30%), moderately high as *I. amnicola*, *I. aristolochiaefolia*, *I. parasitica*, *I. purpurea* and *I. wrightii* (40-70%) and very high as *I. alba*, *I. asarifolia*, *I. carnea*, *I. dumetorum*, *I. hederifolia*, *I. incarnata*, *I. nil*, *I. piurensis*, *I. tiliacea* and *M. quinquefolia* (80-100%). The CGV was >1.00 as *I. alba*, *I. asarifolia*, *I. carnea*, *I. dumetorum*, *I. hederifolia*, *I. incarnata*, *I. nil*, *I. piurensis*, *I. tiliacea* and *M. quinquefolia* and in the other species was <1.00 (Table 1).

Likewise, the germination percentages of chemically treated seeds (with H_2SO_4) were very low as *I. aristolochiaefolia*, *I. cairica*, *I. carnea* *I. nil*, *I. piurensis* and *M. aegyptia* (0-30%), moderately high as *I. alba*, *I. parasitica*, *I. purpurea*, *I. quamoclit*, *I. tiliacea*, *I. wrightii* and *M. umbellata* (40-67%) and very high as *I. asarifolia*, *I. dumetorum*, *I. hederifolia*, *I. incarnata* and *M. quinquefolia* (80-100%). The CGV was >1.00 as *I. dumetorum*, *I. hederifolia* and *I. quinquefolia* and <1.00 as in the rest of species of *Ipomoea* and *Merremia* evaluated (Table 1).

In the *in vitro* germination process (Table 2), the germination percentages of mechanically treated seeds (with sandpaper only) were very low (0-25%), moderately high (40-60%) and very high (75-100%) as *I. alba*, *I. asarifolia*, *I. carnea*, *I. incarnata*, *I. parasitica*, *I. piurensis*, *I. quamoclit*, *I. wrightii*, *M. aegyptia* and *M. umbellata*. The CGV was 0.38 as *I. alba* and *I. asarifolia* and 0.0 only in *I. hederifolia.* The germination percentages of mechanically treated seeds (with sandpaper and GA_3) were very low (0-20%), moderately high (40-60%) and very high (80-100%) as *I. alba*, *I. amnicola*, *I. asarifolia*, *I. carnea*, *I. nil*, *I. piurensis*, *M. quinquefolia* and *M. umbellata*. The CGV was 0.48 as *I. piurensis* and 0.0 as *I. cairica* and *I. incarnata*. In general, the germination treatment of seeds mechanically with sandpaper and GA_3 allowed reaching higher values of seed germination than mechanically with sandpaper only.

Seedling morphology: The seedling morphology data are summarized in Table 1, which shows the degree of apical cleft of the paracotyledonary leaves, i.e., the ratio of apical cleft length to paracotyledon length and the angle of divergence between the two lobes of the paracotyledon (Fig. 1). The

Table 2: *In vitro* germination and coefficient of germination velocity (CGV) seeds of *Ipomoea* and *Merremia*

	Treatments (Scarification)			
	Mechanically with sandpaper		Mechanically with sandpaper and GA_3	
Species	Germination (%)	CGV	Germination (%)	CGV
Ipomoea alba	100	0.38	100	0.39
I. amnicola	25	0.06	100	0.31
I. aristolochiaefolia	20	0.04	60	0.08
I. asarifolia	100	0.38	100	0.38
I. cairica	20	0.07	00	0.00
I. carnea	80	0.28	80	0.28
I. dumetorum	40	0.14	60	0.10
I. hederifolia	00	0.00	20	0.03
I. incarnata	80	0.23	00	0.00
I. nil	40	0.12	80	0.21
I. parasitica	100	0.30	60	0.27
I. piurensis	75	0.15	80	0.48
I. purpurea	60	0.10	40	0.14
I. quamoclit	80	0.21	67	0.14
I. tiliacea	25	0.08	20	0.08
I. wrightii	80	0.33	60	0.23
Merremia aegyptia	80	0.31	60	0.23
M. quinquefolia	60	0.22	100	0.29
M. umbellata	80	0.19	100	0.53

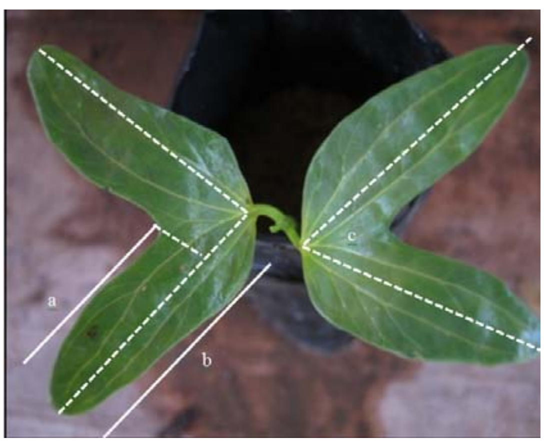

Fig. 1: Model of seedling morphology (*Ipomoea asarifolia*) a: Length of apical cleft of a paracotyledonary leaf, b: Length of paracotyledonary leaf, c: Angle of divergence between two paracotyledonary lobes

length of the apical cleft was highly correlated (r = 0.81) with the angle of divergence.

The seedling morphology of 16 species of *Ipomoea* and 3 species of *Merremia* studies is shown in the Fig. 2. In the *Ipomoea* species, *I. hederifolia* showed the lowest magnitude of apical cleft (0.38) as well as angle of divergence (36°), while *I. quamoclit* showed the largest magnitude of apical cleft (1.0) and the angle of divergence was 165° (Table 3). *M. aegyptia* and *M. umbellata*, showed the largest magnitude of apical cleft with 0.50 and 0.43, respectively and angle of divergence of 55° and 54°, respectively (Table 3).

DISCUSSION

The results on *in vivo* germination showed that the scarified seeds of *Ipomoea* and *Merremia* respond positively to the imbibition process. In *Ipomoea lacunosa* the mass of treated (manual and individually scarified with a scalpel) seeds increased about 120% in 15 h, with full imbibition, whereas, that of non-treated (non-scarified) seeds increased <1%[16].

In another species of *Ipomoea*, manually scarified seeds of *I. lacunosa* germinated to high percentages in all 5 temperatures regimes in dark/light[16], as observed in present study using the temperature of 22-24°C dark/light as the only treatment, confirming, in addition, the observation by other researchers that the seeds of *I. lacunosa*[27] and the several species of *Ipomoea*[18], have PY. On the other hand, the effect of desiccation and scarification on the permeability and structure of the seed coat of *Cuscuta campestris* (Convolvulaceae) was studied. In this study, Hutchison and Ashton[19] used concentrated sulfuric acid to make seeds permeable to water blocking the hilum area of the seeds with lanolin petroleum jelly. Likewise, in big root morning glory (*I. pandurata*) mechanical and chemical scarification caused an increased germination but cool, moist stratification, did not break dormancy and an optimum germination occurred at 20 and 25°C and with alternating temperatures of 20/10 and 30/20°C[28].

The study of Jayasuriya *et al.*[16] had 3 purpose: to document whether seeds of *I. lacunosa* have PY, which has been shown to occur in several *Ipomoea* species, to

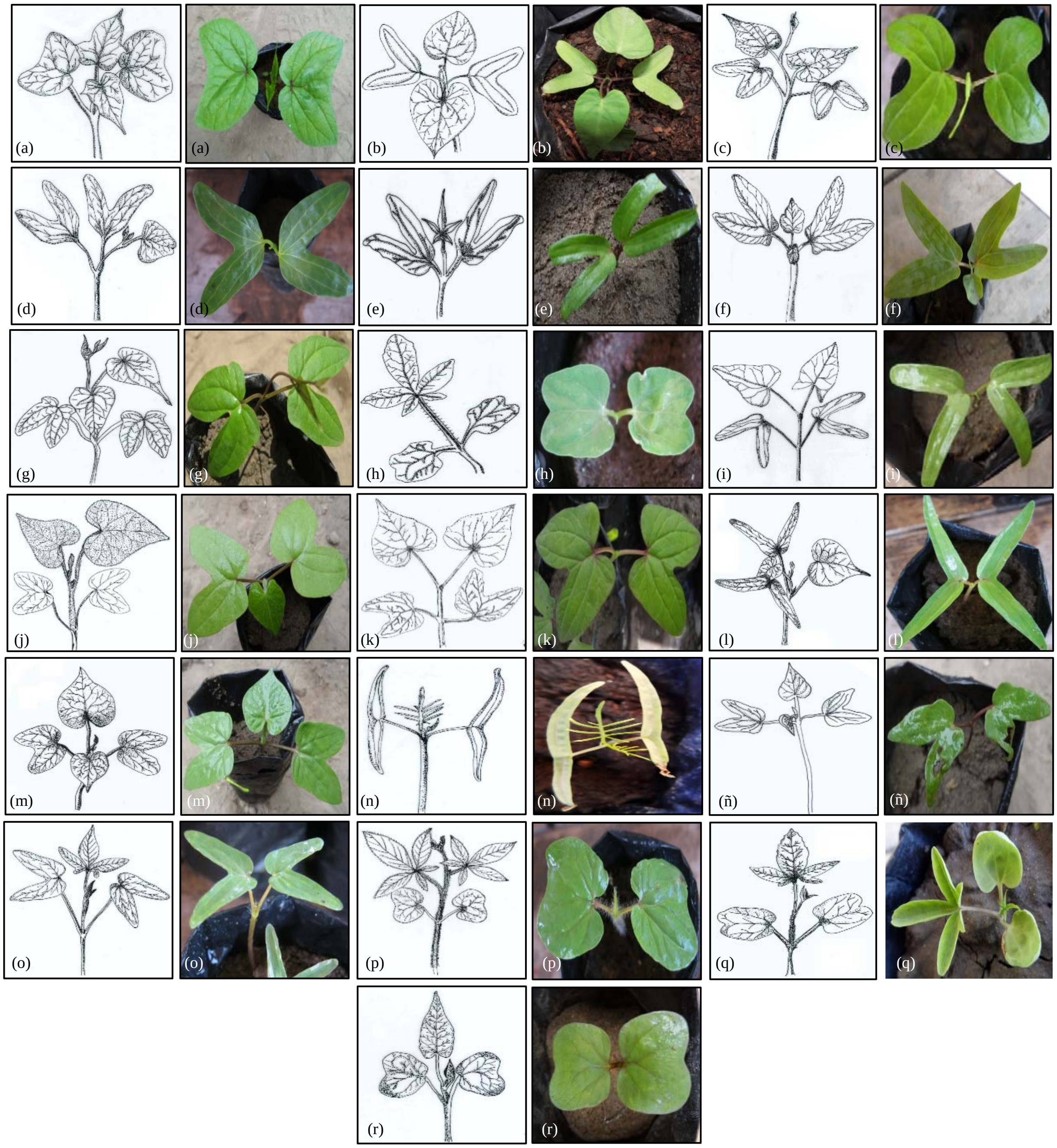

Fig. 2(a-r): Seedling morphology of 16 species of *Ipomoea* and 3 species of *Merremia*, showed the angle of divergence between the 2 lobes of a paracotyledon. a, a: *Ipomoea alba*, b, b: *I. amnicola*, c, c: *I. aristolochiaefolia*, d, d: *I. asarifolia*, e, e: *I. cairica*, f, f: *I. carnea*, g, g: *I. dumetorum*, h, h: *I. hederifolia*, i, i: *I. incarnata*, j, j: *I. nil*, k, k: *I. parasitica*, l, l: *I. piurensis*, m, m: *I. purpurea*, n, n: *I. quamoclit*, ñ, ñ: *I. tiliacea*, o. o: *I. wrightii*, p, p: *Merremia aegyptia*, q, q: *M. quinquefolia*, r, r: *M. umbellata*

document the presence (or not) of water gap in seeds of this species and to describe the water gap morphologically and anatomically. The conclusion was that Convolvulaceae differs from that of taxa in the other 11 angiosperm plant families that produce seeds with PY for which it has been described[14]. This same mechanism would be operating in the species of *Ipomoea* and *Merremia* used in the present investigation, as reported by Jayasuriya *et al.*[29]. Likewise, PY in the subfamily

Table 3: Angle of divergence and length of paracotyledonary leaves of *Ipomoea* and *Merremia* species

Species	Angle between diverging lobes (°)	Length of apical notch (mm) (±SE)	Length of paracotyledonary leaves (mm) (±SE)	Ratio of notch and paracotyledonary leaves(mm) (±SE)
Ipomoea alba	82	19±0.11	28±0.12	0.68±0.001
I. amnicola	52	13±0.13	21±0.15	0.62±0.004
I. aristolochiaefolia	68	21±0.12	31±0.17	0.68±0.002
I. asarifolia	80	22±0.07	32±0.09	0.68±0.001
I. cairica	43	23±0.04	29±0.05	0.79±0.005
I. carnea	69	21±0.14	30±0.07	0.70±0.003
I. dumetorum	63	23±0.06	28±0.14	0.82±0.002
I. hederifolia	36	10±0.11	26±0.08	0.38±0.001
I. incarnata	73	27±0.09	33±0.09	0.82±0.006
I. nil	94	20±0.06	27±0.15	0.74±0.005
I. parasitica	70	19±0.15	28±0.12	0.68±0.004
I. piurensis	112	32±0.08	35±0.16	0.91±0.003
I. purpurea	67	14±0.17	23±0.14	0.61±0.007
I. quamoclit	165	36±0.13	36±0.09	1.00±0.004
I. tiliacea	57	18±0.09	25±0.04	0.72±0.008
I. wrightii	72	23±0.04	29±0.08	0.79±0.006
Merremia aegyptia	55	11±0.14	22±0.04	0.50±0.004
M. quinquefolia	35	5±0.01	16±0.06	0.31±0.001
M. umbellata	54	12±0.06	28±0.17	0.43±0.005

Convolvuloideae probably evolved in the a seasonal tropics from an ancestor with recalcitrant non-dormant seeds and it may have arisen as Convolvulaceae radiated to occupy the seasonal tropics, as reported in several tribes with the exception of Erycibeae and Maripeae[29].

The first idea of germination rate was expressed as coefficient of velocity for 17 cultivated species[30]. In addition, the coefficient of velocity of germination (CVG) gives an indication of the rapidity of germination and increases when the number of germinated seeds increases and the time required for germination decreases, theoretically, the highest possible CVG is 100[31].

In general, in *in vivo* germination process and in the greatest number of species, the highest CGV values (>1.00) were observed when the seeds were mechanically scarified with sandpaper, followed by the chemical scarification with H_2SO_4 for 40 min. The untreated seeds showed the lowest GVC values (<1.00). These values were also higher than in *in vitro* germination process where in no case the CGV values were >1.00.

On the other hand, the results in seedling morphology were very similar to that reported by Das and Mukherjee[21] in their study of several species of *Ipomoea* from the lower Gangetic plain, West Bengal, India. In addition, with the exception of *I. quamoclit* which in present study showed results very similar to those reported by Das and Mukherjee[21] in other species as *I. hederifolia* and *I. nil*, the results were dramatically different, which could be attributed to the ecological conditions of West Bengal (India) and Lambayeque (Peru). In the study of Das and Mukherjee[21], the analysis of the seedling morphology allowed the construction of a phylogeny tree in different directions, however, in this analysis several species studies were perennial woody plants with large seeds. In present study, all species of *Ipomoea* analyzed were strictly herbaceous and with small seeds. On the other hand, the criteria used in the preparation of a phylogeny tree by Das and Mukherjee[21] were not correctly explained, therefore, it was not possible to elaborate a similar phylogeny tree.

CONCLUSION

This study evaluated the effect of various scarification methods on germination of 16 species of *Ipomoea* and 3 species of *Merremia* collected from Lambayeque (Peru). It was observed that in the majority of the evaluated species the germination rate reached 100%.

SIGNIFICANCE STATEMENTS

This study discovers that the conservation of *Ipomoea* and *Merremia* germplasm through seeds and *in vitro* cultures, as well as the morphological identification of seedlings under field conditions. This study will help the researcher to uncover the critical areas of the identification of seedlings under field conditions is possible and to estimate several parameters related to the conservation of the species under study and that many researcher were not able to explore. Thus a new theory on seedlings growth of *Ipomoea* and *Merremia* may be arrived at.

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