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PREGERMINATIVE TREATMENTS OF USPÍ (*COUEPIA POLYANDRA* KUNTH): A FRUIT TREE TO GROW IN SCHOOL GARDENS

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Abstract: The objective was to evaluate pregerminative treatments in uspí (*Couepia polyandra* Kunth) seeds, with the purpose of producing seedlings to plant in green areas in schools. The work was carried out in the nursery of the Multidisciplinary Academic Division of Los Ríos, Tenosique Campus. A completely randomized design was applied with five treatments (unhydrated seeds and seeds hydrated for 24 hours with biozyme® or whey), each treatment with 50 seeds. The seeds were sown in 4-inch PVC gutters and river sand was used as a substrate. Germination percentage, tap root, secondary roots, stem length were measured and the leaves were counted; The data were taken 36 days after sowing. The results indicated that there was no significant difference, the highest percentage of germination was 63%, seedling height of 7.5 cm, main root length of 6.2 cm, 15.94 secondary roots and with three leaves. Afterwards, all the seedlings were replanted in 10x18 cm polyethylene bags with a substrate based on soil and compost (80:20 v/v) for a period of 44 days. It is concluded that after 80 days, uspi seedlings measuring 18 ±2.78 cm in height and 5 ±1.45 leaves were obtained, which were planted in school planters to promote green and pro-environmental schools.
Keywords: *Couepia polyandra*, school gardens, green schools, school environment, school well-being.

INTRODUCTION

Green areas are spaces where natural elements and vegetation predominate; such as trees, shrubs and ornamental plants that fulfill functions of recreation, recreation and rehabilitation (Ministry of the Environment of Chile, 2013). These green areas are a fundamental part of the ecological, social and economic dimensions of a community. In schools, green areas are a mental restorer, promote creativity, are a natural tranquilizer and can contribute to better performance in the teaching-learning process. A study carried out by Gareca and Villarpando (2017) with students between 12 and 17 years old, determined that close to 80% of those surveyed considered the presence of plants at school important because they feel more comfortable, motivated, creative and happy; Therefore, an environment with the presence of plants generates a feeling of well-being and becomes a factor that contributes to improving educational quality. Lopez *et al*. (2016), after a study with students, recommend increasing and improving green areas, and attention must be paid to the pro-environmental perception presented by students. Mejía-Castillo *et al*. (2016) find that green areas in schools are spaces for students to rest more frequently; the same students perceive school green spaces more positively; Schools with larger green areas were rated better in the dimensions of fascination and comfort. Fridrich (2021) indicates that the lack of green areas, especially in schools, promotes an arid education only in concrete spaces, distancing students from the natural world. Therefore, it is important to establish, within educational policies at the national level, a project that allows the construction of green areas within schools.

The *Couepia polyandra* (Kunth) rose tree from the *Chrysobalanaceae* family is native and known as uspí in southwest Mexico (Sol de Mayo *et al*. (2020). It is a wild species and populations are under pressure from anthropogenic activities and change. climatic.

This fruit tree grows in plots or backyard orchards, at altitudes of up to 600 meters above sea level, it can grow up to 20 m with a leafy crown, its leaves are oblong to oblong-elliptical in shape from 6.0 to 12.5 cm, it has terminal axillary inflorescences. and paniculate with white flowers (Figure 1).

Figure 1: Leaves and flowers of uspí trees (*Couepia polyandra* Kunth) planted in school gardens.

The fruits are an ellipsoid drupe of 4 to 6 cm by 2 to 3 cm, with fleshy mesocarp and thin endocarp, they are bright orange when ripe and are consumed when they fall alone from the tree, peaks of fruiting occur during July to October. The fruits have a sweet flavor and from these you can make jams, teas, fresh waters and other products. For their part, Prakash *et al.* (2003) have found compounds of pharmacological interest such as triterpenes, oleanolic acid, betulinic acid, stigmasterol and beta-sitosterol. Similarly, Gao *et al.* (2008) find compounds of medicinal and anti-cancer interest. The propagation of the uspí is sexual, that is, by seed that germinates for two or three months under natural conditions. Mejenes-López *et al.* (2019) studied morphological characteristics and germination percentage of uspí seeds, as well as the production of seedlings at the nursery level, and achieved 76.6% germination after 40 days. Therefore, the objective of this study was to evaluate pregerminative treatments of uspi (*Couepia polyandra* Kunth), in order to produce plants to grow in green areas of schools.

MATERIALS AND METHODS

The work was carried out in the nursery of the Multidisciplinary Academic Division of Los Ríos, located in the municipality of Tenosique Tabasco, Mexico. To obtain the seeds; The ripe fruits of uspi were collected from a healthy 12-year-old tree, planted in a backyard orchard. Afterwards, the pulp (mesocarp) was removed from the fruits, leaving the endocarp free, then the seeds were stored in a cool, dry place for 8 days, before sowing.

Figure 2: Obtaining uspí (*Couepia polyandra* Kunth) seeds.

The experiment was established in a completely randomized design with five treatments (T): T1 Unhydrated seeds; T2 seeds hydrated by immersion for 24 hours; T3 seeds hydrated 24 hours with 3 ml L-1 of Biozyme®, T4 seeds hydrated 24 hours with 30 ml L-1 whey and T5 seeds hydrated 24 hours with 60 ml L-1 of whey, each treatment with 50 seeds. The seeds were sown in a longitudinal position (knowing that the radicle and hypocotyl emerge from the same germ pore) in 4-inch sanitary PVC tubes cut longitudinally and river sand was used as a substrate. The planting date was July 24, 2023; and the germination percentage data and agrometric data of the uspí seedlings were taken after 36 days; time in which at least one treatment presented 50% plus 1 of germinated seeds.

Figure 3: Measurement of variables of uspí (*Couepia polyandra* Kunth) seedlings.

RESULTS AND DISCUSSION

Data collection was carried out 36 days after sowing the seeds. The results indicated that between 50 and 63% germination occurred, only 3% germination increased when the seeds were hydrated for 24 hours, compared to when the seeds were not hydrated. Seeds treated with biozyme® or whey had no significant effect, with 56 and 50% germinating, respectively; the seeds that did not germinate were rotten. Table 1 summarizes the germination results of uspí 36 days after sowing the seeds.

The best way to produce uspí is the direct sowing of the seeds in bags, although there is still a challenge to increase the germination percentage, and the answer may lie in the quality and selection of the seed. Mejenes-López *et al*. (2019) obtained 76.6% germination of uspí seeds at 40 days, which evaluated the germination and characteristics of uspí seedlings (*Couepia polyandra*: *Chrysobalanaceae*) under rustic nursery conditions in Campeche, Mexico.

Regarding the other variables studied (plant height, number of leaves, length of taproot or main root and number ofestate) It was found that there was no significant difference between a treatment. The height of the uspí seedlings was 6 to 7.5 cm, statistically they are the same. All plants had three leaves. The number of secondary roots was 14 to 16 and the length of the taproot or main root between the treatments was 5.34 to 6.20 cm and 14.22 to 16.13 secondary roots (Table 2).

The uspí plant has a taproot or main root welldetermine,which makes it ideal for school green areas and urban parks, as it does not represent a problem that damages sidewalk areas, as happens with other species such as ficus trees (*Ficus benjamina*), which in addition to being an introduced and invasive species, is a very aggressive species with the root system that can invade bodies of water and raise sidewalks. Vargas-Garzón and Molina (2021) describe five species that are currently part of the urban tree planting of Colombian cities, but that have been reported to cause damage to architectural constructions, civil works, home service networks and public lighting in urban space: among these species are ficus (*Ficus benjamina*), rubber (*Ficus elastica*), flamboyant (*Delonix regia*), breadfruit (*Artocarpus communis*) and African tulip (*Spathodea campanulata*); Therefore, they recommend that these species must not be planted in urbanized areas, because their aggressive roots cause costly and serious damage.

Figure 4: Management of uspí (*Couepia polyandra* Kunth) seedlings in the nursery.

After collecting data on the agrometric variables, the seedlings were transplanted into 10 x 18 cm black polyethylene bags, using a substrate containing 80% mountain soil and 20% compost. The seedlings were kept for 44 days in the nursery for acclimatization, and were subsequently transplanted into green areas of schools in the region. To transplant the uspí plants in the green areas of schools, it was done in the following way: first the

Treatment	Treatment description	Seed Number	sprouted seeds	% germination
T1	Untreated seeds	50	30	60.00
T2	Seeds hydrated 24 hours	50	32	63.33
T3	Seeds hydrated for 24 hours with 3 mlL-1 of Biozyme®	50	25	50.00
T4	Seeds hydration 24 hours with 30 mlL-1 lactic acid	50	28	56.66
T5	Seeds hydration 24 hours with 60 mlL-1 lactic acid	50	25	50.00

Table 1. Germination results of uspí (*Couepia polyandra* Kunth) 36 days after sowing the seeds.

Treatment	Treatment description	Plant height (cm)	Number of leaves	Tap root length(cm)	Number of rootssecondary
T1	Untreated seeds	6.00±**1.21 a**	3	5.60 ±1.36 a	15.28 ±7.64 a
T2	Seeds hydrated 24 hours	7.00 ±1.34^{to}	3	5.56 ±1.43 a	15.94 ±7.49 a
T3	Seeds hydrated for 24 hours with 3 ml L-1 of Biozyme TF	7.50 ±1.42^{to}	3	6.20 ±1.59 a	16.13 ±7.96 a
T4	Seeds hydration 24 hours with 30 ml L-1 lactic acid	7.50 ±1.34^{to}	3	5.34 ±1.44 a	14.84 ±6.47 a
T5	Seeds hydration 24 hours with 60 ml L-1lactic acid	7.40 ±1.37^{to}	3	6.00 ±1.42 a	14.22 ±6.89 a

Table 2: Biometric results of uspí (*Couepia polyandra* Kunth) seedlings 36 days after sowing the seeds.

Different letters represent different means (Tukey test p≤0.05).

distance in which the holes were made was measured at a depth of 30 x 30 cm, then a kilogram of compost to the bottom of the hole and water was watered, then the plant was taken out of the bag and placed in the hole placing soil around it. A plan of irrigation, weed control and fertilization activities was programmed. Durán-Espinosa and Lorea (2010) describe the uspí tree with a leafy crown, its leaves are oblong to oblong-elliptic in shape, and it has terminal and paniculated axillary inflorescences with white flowers.

Figure 5: Transplantation of uspí (*Couepia polyandra* Kunth) seedlings in green areas of schools.

CONCLUSIONS

After 36 days, 63% germination and good development of uspí seedlings was achieved. On the other hand, 100% acclimatization of the uspí seedlings to transplanting in a polyethylene bag with a substrate containing 80% soil and 20% compost (v/v) was obtained. The 80-day-old uspí plants were planted in school planters to promote green and pro-environmental schools. It is concluded that the uspí is a species that can be planted in green areas to promote an environmental culture, promote physical creativity, build and promote schools.green.

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