

Scientific name

Arachis pintoi Krapov. & W.C. Greg.

Synonyms

Family/tribe

Family: *Fabaceae* (alt. *Leguminosae* or *Papilionaceae*) tribe: *Aeschynomeneae* subtribe: *Stylosanthinae*, section *Caulorrhizae*.

Common names

pinto peanut (Australia); maní forrajero perenne, maní perenne (Spanish); amendoim forrageiro (Portuguese); kacang pinto (Indonesia); thua lisong tao (Thailand).

Morphological description

Stoloniferous, perennial herb developing a strong taproot on the older crowns and forming a dense mat of stolons. Stems initially prostrate, becoming ascendant to 50 cm in height depending on environment and provenance. Leaves tetrafoliolate, with ovate leaflets up to 4.5 cm x 3.5 cm. Flowers on short axillary racemes, standard 12-17 mm wide, yellow. The terminal pod on the peg usually contains 1 seed, sometimes 2, while pods formed along the peg contain only 1. Abscission layer between seed and peg, causing separation from plant on maturity. Seed size varies markedly with provenance, ranging from over 9,000 seeds/kg in ATF 3270 (GRIF 7499, PI 604813) to 4,000 in ATF 495 (BRA-012122, CIAT 18744), and averaging 7,000 in the most common cultivar, CIAT 17434, first released as 'Amarillo' in Australia.

Distribution

Native to:

South America: Brazil (Bahia, Goiás, Minas Gerais states).

Generally occurs under low (open) forest native vegetation.

Now grown throughout the wet tropics and subtropics, and the upland tropics up to c. 1,400 m asl .

Uses/applications

Permanent pasture for intensive grazing systems; ground cover in open situations and under trees; ornamental. While mostly too low-growing for cut-and-carry, some provenances are used for these systems. No- or limited-till systems oversowing with ryegrass in the subtropics.

Ecology

Soil requirements

Generally found on red, sandy loam river-bottom soils of low to moderate fertility and high aluminium saturation, particularly in low

areas, which are wet to flooded during the wet season. In cultivation, *A. pintoï* is not restricted by soil texture. Successful on soils with pH (H₂O) ranging from about 4.5-7.2, although growth reduced below pH 5.4. Prefers moderate to high fertility but can survive in infertile soils. Low requirement for copper, molybdenum and lime, and moderate requirement for phosphorus and zinc. Tolerant of high levels of manganese and aluminium. Tolerant of periods of waterlogging . Low to moderate tolerance of salinity.

Moisture

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Occurs in areas receiving an annual rainfall from about 1,500-2,000 mm. Will survive in areas with annual rainfall of 1,000 mm or less, but grows best with over 1,500 mm/yr. Survives dry seasons of 4 months. Tolerant of flooding, but does not grow in permanently inundated or waterlogged situations. Irrigation will maintain survival during dry periods but not promote much growth.

Temperature

Originates from about 13-17°S, and although most collections have been made between 300 and 600 m asl, extremes range from near sea level to about 1,100 m asl. This equates to average annual temperatures of about 21-23°C. *A. pintoï* grows best between about 22°C (72°F) and 28°C (82°F). Tops are killed by frost, but stands recover from crowns and seedling regeneration.

Light

Among the most shade tolerant of warm season legumes tested. May produce more growth in shade than in full sunlight.

Reproductive development

Flowers throughout the growing season , although limited by moisture in all situations, and low temperatures or daylength in the subtropics. Flowering apparently stimulated by dry-wet cycle as in *A. hypogaea* . Seed is produced on pegs (gynophores) developing from extension of the ovary, placing the seed in the soil (geocarpy), mostly in the top 7 cm. Pegs vary in length from 1-27cm long. Pegs do not penetrate hard, dry ground and shrivel and die on contact with the soil. In the upland tropics, it normally takes about 6 weeks from flowering to mature pods towards the end of the growing season , although this may be less in mid-season or in the tropics.

Defoliation

Extremely tolerant of low and regular defoliation .

Fire

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Rarely subjected to fire by virtue of preferred habitat. However, high levels of soil seed and the capacity to re-establish new crowns at depth if surface crown is destroyed, ensure recovery after fire.

Agronomy

Guidelines for the establishment and management of sown pastures.

Establishment

Can be established from cuttings or from seed, although plants established from seed develop an effective root system more rapidly. Moderate levels of dormancy in fresh seed can be reduced by pre-drying at 40°C for 10-14 days prior to planting. Once dried, seed should be stored in a cool dry environment - large reductions in viability of inadequately dried and inappropriately stored seed have been experienced within 10 months of harvest. Seed should be inoculated with CIAT 3101 (QA 1091) strain *Bradyrhizobium* - CIAT 3806 and 2138 also effective.

Seed should be sown at 10-30 kg/ha seed-in-pod depending on seed quality and price, and the desired early stand density. Should be sown 2-5 cm deep - surface sowings result in poor germination and high seed losses to birds and rodents. Care should be taken in selection of planting equipment - some mechanisms destroy the soft seed.

Fertiliser

Does not require high levels of fertiliser in most situations. In very infertile soils in Colombia, an establishment application of P 20, Ca 100, K 20, Mg 14 and S 22 kg/ha and maintenance dressings every two years of half this amount have given consistently good results. Appears unresponsive to applied Mo at establishment, due to high Mo reserves in the seed. Applications of Mo may be necessary in 2-3 year-old stands on very acid soils.

Compatibility (with other species)

Grows well with both sward forming and tussock grasses. Regular defoliation necessary when grown with aggressive grasses to maintain high proportion of legume. Grows well under trees.

Companion species

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Grasses: Creeping species such as *Brachiaria decumbens*, *B. humidicola*, *Paspalum maritimum*, *P. notatum*, *Axonopus fissifolius*, *Digitaria eriantha*, *Cynodon dactylon*, and *C. nlemfuensis*, but also forms stable mixtures with bunch grasses such as *Panicum maximum* and *Paspalum atratum* where the legume colonises the inter-bunch spaces.

Legumes: Generally not grown in association with other legumes, unless grown under leguminous trees such as *Leucaena leucocephala* and *Calliandra calothyrsus*.

Pests and diseases

Diseases cause no long-term or serious damage, but rats and mice are attracted to the nuts and can be a problem. Cv. Amarillo is resistant to the major groundnut diseases, rust (*Puccinia arachidis*), early leaf-spot (*Cercospora arachidicola* = *Mycosphaerella arachidis*) and late leaf-spot (*Phaeoisariopsis menispermata* = *Phaeoisariopsis menispermata*).

(*Pnaeoisariopsis personata* = *Cercosporium personatum* = *Mycosphaerella berkeleyi*). Fungal diseases recorded include various leafspots (*Cercospora* sp., *Phomopsis* sp., *Periconia* sp., *Cylindrocladium* sp. and *Colletotrichum gloeosporioides*), the latter also being associated with black stem lesions in Colombia, scab (*Sphaceloma arachidis*) and foliar blight (*Rhizoctonia solani*), although none has caused serious damage. Best not to use pinto peanut in custard apple or atemoya (*Annona* sp.) orchards because *Cylindrocladium*, which causes minor damage to the legume, can cause serious damage to the tree leaves. 'Amarillo' has moderate to high resistance to the various root-knot nematodes (*Meloidogyne* spp.) but is susceptible to the root-lesion nematode (*Pratylenchus brachyurus*). Leaves of some plants have an apparently non-pathogenic variegation or chimera that appears similar to the symptoms of mosaic virus. Peanut mottle *potyvirus Arachis pintoï* can cause chlorotic ringspots in leaves.

Can be infested by spider mites (*Tetranychus* sp.), which do not cause major damage under field conditions.

Ability to spread

Spreads by stolons, up to 2 m/year in the wet tropics and about 1 m/yr in the subtropics. Since seed is set underground, natural dissemination can only be by water erosion. Seeds are soft and digestible and not spread through animals.

Weed potential

Once established, *A. pintoï* is very difficult to eradicate. It is generally spread by cultivation, and favoured by regular grazing or mowing. Tolerant of many common herbicides. Can be controlled by ceasing defoliation in the presence of taller aggressive species or spraying with metsulfuron methyl. Stands recover quickly by virtue of large, fairly persistent soil seed banks.

Feeding value

Nutritive value

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13-25% crude protein, 60-70% dry matter digestibility. Relatively low levels of condensed tannins.

Palatability/acceptability

Well eaten by all classes of animals, including chickens, ducks and pigs. Selected by cattle if animals exposed to the legume previously.

Toxicity

No record of adverse effects.

Production potential

Dry matter

5 t/ha/yr DM growing with *Brachiaria humidicola* producing 20 t/ha DM, and 10 t/ha growing with *B. ruziziensis* producing 11 t/ha in Colombia

and to the growing with *B. ruzizensis* producing 11 t/ha in Colombia. In subtropical Australia growing in pure stand cut to ground level every 4 weeks produced up to 6.5 t/ha/yr DM. More recent work indicates cumulative yields up to 24 t/ha DM over 2 years in Brazil.

Animal production

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In Colombia, annual liveweight gains up to 200 kg/head and 920 kg/ha depending on companion grass and dry season stress. In Costa Rica, liveweight gains of cattle grazing *A. pintoi* in a mixed pasture with *Brachiaria brizantha* of nearly 1,000 kg/ha/yr were recorded. Improvement in liveweight gain and milk production from 20-200% and 17-20% respectively, over grass -only.

Genetics/breeding

Diploid ($2n = 20$), self-pollinating with low proportion of out-crossing. Can form apparently sterile hybrids with the diploid *A. repens*, also section *Caulorrhizae* (see "Promising Accessions").

Seed production

Seed produced below ground, and separates from peg soon after maturity. May need to mow regularly during the growing season to encourage seed set and to eliminate haven for rodents attracted to the seed. Most harvesting systems depend on screening of soil to obtain seed, although some attempts to use conventional peanut harvesting methods that rely on persistent link between seed and peg. Seed is produced throughout much of the growing season, provided moisture is adequate, so harvest is normally undertaken at end of season. Seed-in-pod yields of over 1 t/ha have been achieved in 'Amarillo', although some provenances are less productive (e.g. CIAT 18750), and some more productive yielding up to 4 t/ha 15 months after sowing. No reduction in "pops" due to applied calcium in Australia. Seed should be dried and stored under low humidity to avoid rapid seed mortality.

Herbicide effects

Tolerant of acifluorfen, bentazone, 2,4-D, 2,4-DB, fluazifop-butyl, and sethoxydim. Susceptible to metsulfuron-methyl and glufosinate.

Strengths

- Tolerant of heavy grazing.
- Tolerant of low fertility.
- Productive.
- High quality.
- Good ground cover.
- Combines well with competitive sward grasses.

Limitations

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- Not well suited to cut-and-carry systems.
- Needs good moisture for production.
- Underground seed attracts rodents.

- Difficult to eradicate.
- Slow and costly establishment.

Other comments

Selected references

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Internet links

<http://www.fao.org/ag/AGP/AGPC/doc/Gbase/DATA/pf000463.htm>

<http://www.fao.org/ag/aga/agap/frg/AFRIS/Data/578.HTM>

<http://www.desertsunmarketing.com/peanut.html>

Cultivars

Cultivars	Country/date released	Details
'Amarillo' (GK 12787, PI 337361, PI 338314, PI 338447, CPI 58113, CIAT 17434, IRI 2270, IRFL 4222, I 44457)	Australia (1987)	Initial provenance, from Bôca do Córrego, Bahia, Brazil, 26 m asl, 15°51'S (coll. 1954). Mostly prostrate to about 10 cm, ascending to 20 cm. Leaves mostly pale green, becoming dark green in shade. Used as forage and ground cover.
'Maní Forrajero Perenne' (GK 12787)	Colombia (1992)	'As above'
'Pico Bonito' (GK 12787)	Honduras (1993)	"
'Amarillo MG-100' (GK 12787)	Brazil (1994)	"
'Maní Mejorador' (GK 12787)	Costa Rica (1994)	"
'Maní Forrajero' (GK 12787 + BRA-012122)	Panama (1997)	"
'Golden Glory' (unknown origin)	Hawaii (1996)	From seed sent to Hawaii from Brazil. Released by the nursery industry as an ornamental ground cover for use in the open and under trees. Differs from 'Amarillo' in having slightly shorter calyx tube (hypanthium) and smooth undersides of the leaf (cf. hairy in 'Amarillo').
'Alqueire-1' (BRA-037036)	Rio Grande do Sul, Brazil (1998)	Released as a forage for the subtropics of Brazil. following work by the Departamento de Plantas Forrageiras da Universidade

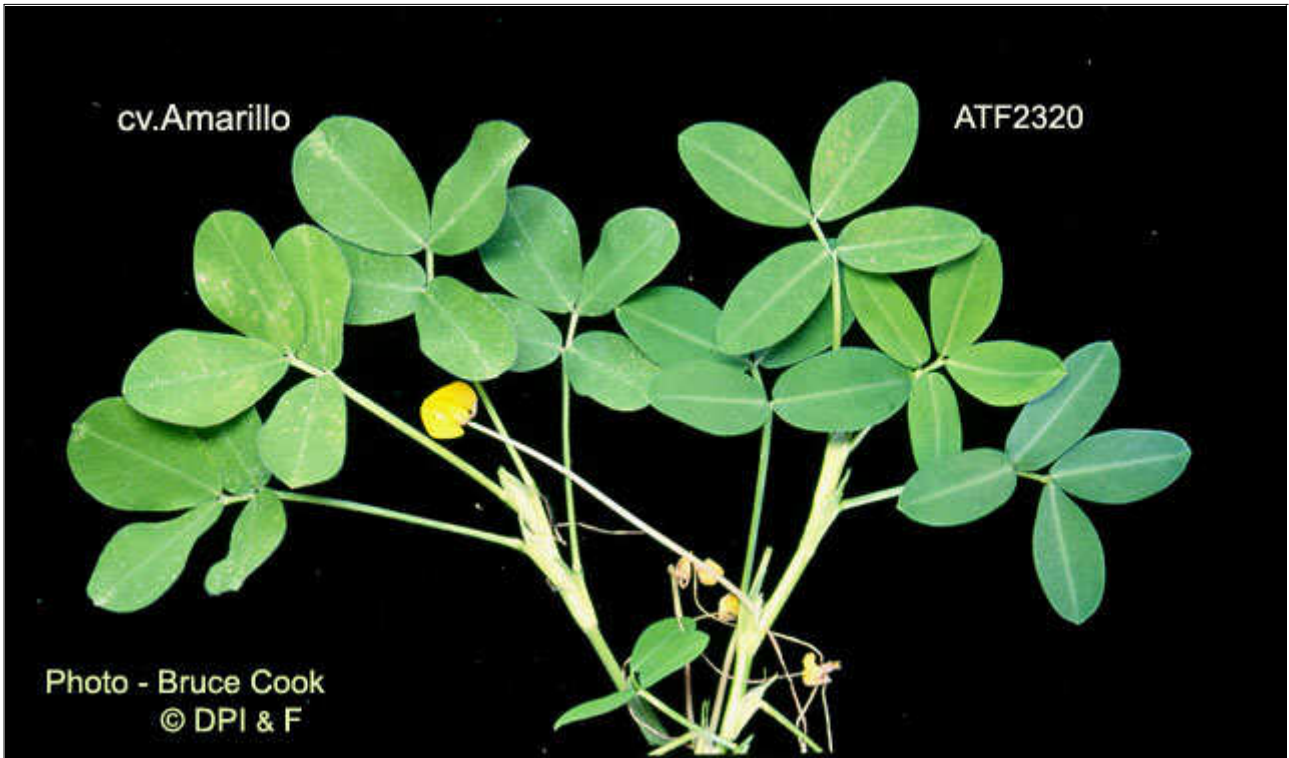
		Federal de Rio Grande do Sul.
'Porvenir' (BRA-012122, CIAT 18744, CPI 133550, ATF 495)	Costa Rica (1998)	From Unaí, Minas Gerais, Brazil, 850 m asl , 16° 08'S. Leaflets slightly smaller and more elongate than 'Amarillo', and blue green in colour. Flowers larger and darker yellow, and pod larger than in 'Amarillo' (see Morphological description). Well adapted to the low tropics with 1,500-3,500 mm annual rainfall. More drought tolerant than 'Amarillo', persisting in areas with 4-5 months dry season. Becomes less vigorous >1,400 m asl. As well as forage , is used as an ornamental, and ground cover in coffee, citrus, forestry, African palm and macadamia.
'Itacambira' (W 34b, BRA-031143, CIAT 22160, ATF 2320, IRFL 7133)	Brazil	From Francisco Badaro, Minas Gerais, Brazil, 360 m asl, 17°03'S. Greater tendency to ascend than other cultivars, growing to 50 cm without the assistance of other species. Very drought tolerant. Well-developed, deep, woody taproot , with 60 percent of the root-system in the top 30 cm, penetrating to 1.95 metres. Greater potential for cut-and-carry than other cultivars.
'Belmonte' (BRA-031828)	Brazil (1999)	Released by Estação de Zootecnia do Extremo Sul (ESSUL), Itabela, Bahia, Brazil on the basis of persistence and animal production in southern Bahia where annual rainfall varies from 1,200-1,400 mm. More tolerant of dry periods than other lines tested.

Promising accessions

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Promising accessions	Country / Region	Details
CIAT 18747 (ATF 2717)	Tropical America	Rapid establishment and more efficient than other accessions tested in extracting P from rock

		phosphate when in association with VAM (Vesicular- Arbuscular- Mycorrhiza). Could be more appropriate for degraded soils where native inoculum of VAM may be low.
CIAT 22160 (see cv. Itacambira), CIAT 22172	Tropical America	Less dependent on VAM when rock phosphate was applied and thus could be more appropriate for degraded soils where native inoculum of VAM may be low.
BRA/CIAT -031143/22160, -030449, -031836, -031828, -031844, -031135, -015121/18748, -013251/17434, -030546, -015598/18750	Brazil	Rapid ground cover and early performance in seasonally flooded land with <i>Paspalum atratum</i> BRA-009610 and <i>Brachiaria decumbens</i> CIAT 16488.
CIAT 18744, 18748, 18751, and 22160.	Humid tropics of Central and South America.	Faster establishment and/or higher production than CIAT 17434.
CIAT 18744, CIAT 22268	Colombia	Broader adaptation than CIAT 17434.
'Amarillo' x <i>A. repens</i> CPI 28273.	Australia	Chance hybrid from nursery-produced seed. Intermediate in form between the large-leaved <i>A. pinto</i> and the small-leaved <i>A. repens</i> . Strongly stoloniferous, and promising as a ground cover in orchards.



Leaf shape of two genotypes.

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Geocarpic pods, and seeds.

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Geocarpic pod formation.

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Foliage and flowers.

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