

Plant		Walnut		491	Primary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Color of shoot	10 shoots	Observation	3:Pale 5:Intermediate 7:Deep		Observe the surface color of 1-year-old dormant shoots
2	Leaf size	15 leaves	Measurement	square cm (integer)		Measure lengths (L) and widths (W) of odd-pinnate leaflets (15 leaves) collected from central part of moderate growing shoots in August and calculate leaf area with approximate value by $\pi \times L \times W/4$
3	Leaflet size	15 leaves	Measurement	square cm (integer)		measure lengths (L) and widths (W) of leaflets and calculate leaf area with approximate value by $\pi \times L \times W/4$.
4	Number of leaflet	15 leaves	Measurement	number (round to the 1st decimal place)		Count the number of leaflets
5	Color of young leaf	15 leaves	Observation	1:Yellowish green 2:Light reddish green 3:Reddish green		Observe the color of young leaves just after unfolding at the top of moderate growing shoots in August
6	Size of female flower	10 flowers	Measurement	mm (integer)		Measure the width of spread stigma at full bloom stage
7	Color of female flower	10 flowers	Observation	1:Light yellow 2:Yellow 3:Partially red 4:Red		Observe the color of stigma at full bloom stage
8	Dichogamy	10 catkins or clusters	Observation	1:Protogyny 2:Protandry 3:Synacmy		Observe during the flowering period
9	Fruit shape in longitudinal section	10 fruits	Observation	1:Round 2:Ovate 3:Elliptical		Observe the fruit shape with a suture line before the dehiscence of husk
10	Nut shape in longitudinal section	10 nuts	Observation	1:Round 2:Ovate 3:Oblate 4:Square 5:Elliptical 6:Oblong 7:Conical 8:Spindle 9:Acuminate ovate		Observe the shell shape with a suture line
11	Color of nut	10 nuts	Observation	1:Light brown 2:Light yellowish brown 3:Brown 4:Brown black		Observe surface color of shells

Plant		Walnut		491	Primary optional character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Shape of leaflet serration	15 leaves	Observation	0:Absent 9:Present		Observe healthy mature leaves
2	Time of hull cracking	2 trees	Measurement	date		Observe the date when 2-3 husks dehisced and nut became visible
3	Nut size	10 nuts	Measurement	cubic cm (integer)		Compute the volume by length, width and thickness of 10 healthy nuts
4	Weight of nut	10 nuts	Measurement	g (round to the 1st decimal place)		Measure the average weight of healthy 10 nuts

Plant		Walnut		491	Secondary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Sprouting time	2 trees	Measurement	date		Observe the date when green tip appeared in more than three buds per tree
2	Flowering time of female flower	2 trees	Measurement	date		Observe the date when the stigma appeared in 2-3 flowers per tree
3	Maturing time	2 trees	Measurement	date		Observe the date when 20-30% fruits dehisced or dropped per tree
4	Physiological fruit drop	2 trees	Observation	0:Absent 3:Few 5:Intermediate 7:Many		Observe the amount of immature fruit drop in June or July
5	Shell strength	10 nuts	Observation	3:Week 5:Intermediate 7:Strong		Observe the difficulty of cracking of shells by a nut cracker
6	Strength of septum in shell	10 nuts	Observation	3:Week 5:Intermediate 7:Strong		Observe the difficulty to take out kernels from the shell
7	Adhesion of seed coat	10 nuts	Observation	3:Easy 5:Intermediate 7:Difficult		Observe the difficulty to peel off seed coats from well dried kernels
8	Weight of kernel	10 nuts	Measurement	g (round to the 1st decimal place)		Measure the average weight of kernels of healthy 10 nuts
9	Color of kernel	10 nuts	Observation	3:Pale 5:Intermediate 7:Deep		Observe the over color of kernels
10	Cold injury	2 trees	Observation	0:Absent 3:Little 5:Intermediate 7:Much		Determine based on the degree of the occurrence of cold injury in a field
11	Resistance to Melanconis disease	2 trees	Observation	1:Resistant 3:Moderately resistant 5:Moderately susceptible 7:Highly susceptible		Determine based on the degree of the occurrence of the disease caused by Melancois juglandis

Plant		Walnut		491	Secondary optional character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Tree habit	2 trees	Observation	3:Upright 5:Intermediate 7:Spreading		Judge by the general shape and growth characteristics of trees
2	Tree vigor	2 trees	Observation	3:Low 5:Intermediate 7:High		Determine based on elongation, thickness and length of shoot
3	Number of female flowers	10 flower clusters	Measurement	flowers (round to the 1st decimal place)		Count the number of female flowers per cluster at full bloom stage
4	Quantity of pollen	10 male catkins	Measurement	g (round to the 1st decimal place)		Measure the weight of pollen collected from 10 male catkins under 25 degree centigrade
5	Number of fruits in fruit cluster	10 clusters	Measurement	fruits (round to the 1st decimal place)		Count the number of fruits per cluster before maturing
6	Number of empty nuts	10 nuts	Observation	0:Absent 3:Few 5:Intermediate 7:Many		Determine based on the observation of nuts
7	Thickness of shell	10 nuts	Measurement	mm (round to the 1st decimal place)		Measure the thickness of the equator part of shell without a suture

Plant		Walnut		491	Tertiary essential character	
No	Characters	No. of samples	Methods	Rank or measurement unit		Remarks
1	Proportion of kernel	10 nuts	Measurement	% (round to the 1st decimal place)		Calculate the percentage of kernel weight to nut weight
2	Sweetness of kernel	10 nuts	Sensory	0:Absent 3:Low 5:Intermediate 7:High		Evaluate the degree of sweetness by eating dry kernels
3	Bitterness of kernel	10 nuts	Sensory	0:Absent 3:Low 5:Intermediate 7:High		Evaluate the degree of bitterness by eating dry kernels
4	Yield	2 trees	Measurement	kg/tree (round to the 1st decimal place)		Measure the nut weight per tree after harvest

Plant		Walnut			491	Tertiary optional character		
No	Characters		No. of samples	Methods	Rank or measurement unit			Remarks
1	Aroma of kernel		10 nuts	Sensory	0:Absent 3:Weak 5:Intermediate 7:Strong			Evaluate the degree of fragrance by eating dry kernels
2	Alternate bearing		2 trees	Measurement	0:None 3:Light 5:Intermediate 7:Severe			Determine by the yields of several years