

Amphasys Pollen Analysis Instructions

January 2025



The following recommendations for measurement of pollen or microspores are best practice suggestions. They are most likely to produce good results for viability, development stages and ploidy measurements. It is recommended to use fresh samples, if possible and to filter the samples before use and measure immediately. Dried pollen samples should be rehydrated before measurement. Pollen and microspores are complex particles influenced by many factors that can have an effect on the outcome of the measurements (stability at the flowers/anthers, in AF buffer, pollen/flower storage etc.). Please refer to our QuickGuides for more details.

Overview General information

Measurement templates:	Templates please contact Amphasys support team.
Pollen size:	Pollen size can vary about 20% or even more! Polyploidy influences pollen size. Please contact Amphasys support for special applications.
AmphaFluid (AF) buffer recommendations:	Pollen viability: column "AF buffer pollen"
	Further purposes: also try "alternative AF buffers"
Sample preparation:	Please refer to the Quickguides.
Dried, stored pollen:	Rehydration of pollen, equilibration in buffer
Sticky or oily pollen:	Add 0.05% Tween 20 or 80
Microspores, protoplasts	microspores or protoplasts of most species work with AF6 or a dilution of the microspore/protoplast isolation medium with AF6 1:4 to 1:6
Contact:	For any questions, assistance and templates: support@amphasys.com
Chip size:	F=80 µm D=120 µm E=250 µm G=400 µm

Species	English	Family	Class Group	Pollen-Size (µm)	Form	Ampha-Chip (µm)	Filter size (µm)	AF buffer pollen	AS PRO Pollen Template	AS PRO Microspore Template	alternative AF buffers
Abelmoschus esculentus	okra	Malvaceae	Dicots	120-150	round spiny	400	300	11	400_Large		6
Acer campestre	field maple	Sapindaceae	Dicots	40	triangular	120	100	6	120_Large		5
Acer platanoides	sycamore maple	Sapindaceae	Dicots	35	triangular	120	100	6	120_Large		5
Acer pseudoplatanus	norway maple	Sapindaceae	Dicots	40	triangular	120	100	6	120_Large		5
Actinidia deliciosa	kiwi fruit	Actinidiaceae	Dicots	25 - 50	triangular	120	100	6	120_Large	msp_120_small	5
Adonis vernalis	adonis	Ranunculaceae	Dicots	29	round	120	50	6	120_Large		5
Aesculus hippocastanum	buckeye	Sapindaceae	Dicots	26	round	120	50	6	120_Large		5
Aesculus pavia	red buckeye	Sapindaceae	Dicots	30	round	120	50	6	120_Large		5
Agapanthus	lily of the Nile	Amaryllidaceae	Dicots	55	prolate	250	100	6	250_Small		5
Alliaria petiolata	garlic mustard	Brassicaceae	Dicots	20-25	round	120	50	10	120_Small		
Allium cepa	onion	Amaryllidaceae	Monocots	30	prolate	120	50	10	120_Small	msp_120_small	6
Allium giganteum	giant onion	Amaryllidaceae	Monocots	35	prolate	120	50	10	120_Large	msp_120_small	6
Allium porrum	leek	Amaryllidaceae	Monocots	30	prolate	120	50	10	120_Large	msp_120_small	6
Allium schoenoprasum	chive	Amaryllidaceae	Monocots	26	prolate	120	50	10	120_Small	msp_120_small	6
Allium ursinum	wild garlic	Amaryllidaceae	Monocots	30	prolate	120	50	10	120_Small	msp_120_small	6
Alnus glutinosa	alder	Betulaceae	Dicots	25	round	120	50	6	120_Large		5
Aloe vera	aloe	Aloaceae	Monocots	38	prolate	120	100	6	120_Large		
Alstroemeria	Peruvian lily	Liliaceae	Monocots	50x120	prolate	250	50	6	250_Large		11
Althaea rosea	hollyhock	Astereaceae	Dicots	140	round spiny	400	200	11	400_Large		6
Amaryllis	amaryllis	Amaryllidaceae	Monocots	90	prolate	250	150	11	250_Large		6
Amaranthus spec.	amaranth	Amaranthaceae	Dicots	20-30	round	120	50	6	120_Large		
Amelanchier ovalis	snowy mespilus	Rosaceae	Dicots	32	triangular	120	50	6	120_Large		

Species	English	Family	Class Group	Pollen-Size (µm)	Form	Ampha-Chip (µm)	Filter size (µm)	AF buffer pollen	AS PRO Pollen Template	AS PRO Microspore Template	alternative AF buffers
Anthriscus sylvestris	cow parsley	Umbelliferae	Dicots	15-26	prolate	120	50		6	120_Small	
Anemone hupehensis	Japanese anemone	Ranunculaceae	Dicots	22	round	80	50		6	250_Medium	
Angelonia spec	snapdragon	Scrophulariaceae	Dicots	15	round	80	50		6	80_Large	
Anemone nemorosa	anemone	Ranunculaceae	Dicots	30	round	120	50		6	120_Large	
Anthemis tinctoria	mayweed	Asteraceae	Dicots	30	round spiny	120	50		6	120_Large	
Anthurium	flamingo flower	Araceae	Monocots	15-20	round	80	50		6	80_Large	
Aquilegia vulgaris	columbine	Ranunculaceae	Dicots	25	triangular	120	50		6	120_Small	
Arabidopsis thaliana	mouse-ear cress	Brassicaceae	Dicots	15x30	prolate	80/120	50		10	80_Large/120_Small	msp_80
Asparagus	asparagus	Asparagaceae	Monocots	20 - 25	prolate	120	50		4	120_Small	msp_80
Aster amelius	aster	Asteraceae	Dicots	32	round spiny	120	50		6	120_Large	
Aubrieta	aubrieta	Brassicaceae	Dicots	30	prolate	120	50		10	120_Large	
Avena sativa	oat	Poaceae	Monocots	40-50	round	250	100		6	250_Small	msp_120_small
Averrhoa carambola	carambola	Oxalidaceae	Dicots	28	round	120	50		6	120_Large	
Begonia spec	begonia	Begoniaceae	Dicots	10-25	prolate	80/120	50		6	80_Large/120_Small	
Bellis perennis	daisy	Compositae	Dicots	20	round spiny	120	50		6	120_Small	
Berberis thunbergii	red barberry	Berberidaceae	Dicots	35	round	120	50		6	120_Large	
Beta vulgaris	beet, sugar beet and other	Amaranthaceae	Dicots	25	round	120	50		10	120_Small	
Betula pendula	birch	Betulaceae	Dicots	22	round	120	50		6	120_Small	5
Betula spec	birch	Betulaceae	Dicots	18 - 30	round	80/120	50		6	80_Large/120_Small	5
Bidens ferulifolia	beggarticks	Asteraceae	Dicots	31	round spiny	120	50		6	120_Large	
Biscutella laevigata	buckler-mustard	Brassicaceae	Dicots	25-30	round	120	50		10	120_Large	
Bougainvillea glabra	bougainvillea	Nyctaginaceae	Dicots	35	round	120	50		6	120_Large	5
Brassica napus	rape seed / canola	Brassicaceae	Dicots	20-25	prolate	120	50		10	120_Small	msp_120_small
Brassica napus rapifera	swede	Brassicaceae	Dicots	20-26	prolate	120	50		10	120_Small	msp_120_small
Brassica oleracea cultivar	other cultivars	Brassicaceae	Dicots	20-25	prolate	120	50		10	120_Small	msp_120_small
Brassica oleracea var. botrytis	cauliflower	Brassicaceae	Dicots	20-25	prolate	120	50		10	120_Small	msp_120_small
Brassica oleracea var. gemmifera	Brussels sprouts	Brassicaceae	Dicots	20-26	prolate	120	50		10	120_Small	msp_120_small
Brassica oleracea var. gongyloides	kohlrabi	Brassicaceae	Dicots	20-25	prolate	120	50		10	120_Small	msp_120_small
Brassica oleracea var. italica	broccoli	Brassicaceae	Dicots	20-25	prolate	120	50		10	120_Small	msp_120_small
Brassica rapa chinensis	Chinese cabbage	Brassicaceae	Dicots	20-25	prolate	120	50		10	120_Small	msp_120_small
Buddleja davidii	summer lilac	Scrophulariaceae	Dicots	16	square	80	50		6	80_Large	
Calendula officinalis	marigold	Asteraceae	Dicots	30	round spiny	120	50		6	120_Large	5
Calluna vulgaris	common heather	Ericaceae	Dicots	22-26	tetrad	120	50		6	120_Small	5
Camellia japonica	camellia	Theaceae	Dicots	45	triangular	120/250	100		5	120_Large/250_Small	
Camellia oleifera	tea oil camellia	Theaceae	Dicots	48	triangular	120/250	100		5	120_Large/250_Small	
Campanula spec.	bell flower	Campanulaceae	Dicots	20 - 35	round	120	50		5	120_Large	6
Cannabis sativa	hemp	Cannabaceae	Dicots	26	round	120	50		6	120_Large	
Capsicum annum	sweet pepper	Solanaceae	Dicots	25 - 30	triangular	120	50		10	120_Large	msp_120_small
Capsicum frutescense	chilli	Solanaceae	Dicots	30 - 35	triangular	120	50		10	120_Large	msp_120_small
Capsicum spec.	pepper	Solanaceae	Dicots	20 - 35	triangular	120	50		10	120_Large	msp_120_small
Cardamine pratense	lady's smock	Brassicaceae	Dicots	32	round	120	50		10	120_Large	
Carica papaya	papaya	Caricaceae	Dicots	36	round	120	50		6	120_Large	msp_120_small
Carpinus betulus	common hornbeam	Betulaceae	Dicots	30 - 40	round	120	50		6	120_Large	5
Carya illinoensis	pecan	Juglandaceae	Dicots	30x60	prolate	250	50		6	250_Small	
Caryopteris x clandonensis	bluebeard	Lamiaceae	Dicots	16	round	80	50		6	80_Large	
Castanea sativa	chestnut	Fagaceae	Dicots	16	triangular	80	50		6	80_Large	
Cenchrus ciliaris	buffel-grass	Poaceae	Monocots	60	round	250	100		6	250_Small	
Centaurea montana	mountain bluet	Asteraceae	Dicots	36	round spiny	120	50		6	120_Large	
Cerastostigma plumbaginoides	hardy blue-flowered leadwort	Plumbaginaceae	Dicots	68	round	250	100		6	250_Large	

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Cercis canadensis	eastern redbud	Fabaceae	Dicots	25	triangular	120	50	5	120_Large		6
Chelidonium majus	greater celandine	Papaveraceae	Dicots	27	triangular	120	50	6	120_Large		5
Chenopodium quinoa	quinoa	Amaranthaceae	Dicots	20-25	round	120	50	6	120_Large	msp_120_small	10
Chionodoxa luciliae	glory of th snow	Asparagaceae	Monocots	33	prolate	120	50	6	120_Large		
Chrysanthemum frutescens	Paris daisy	Asteraceae	Dicots	40	round spiny	250	100	6	120_Large		5
Chrysanthemum grandiflorum	chrysants	Asteraceae	Dicots	35	round spiny	120	50	6	120_Large		5
Chrysanthemum spec.	chrysants	Asteraceae	Dicots	30 - 45	round spiny	120/250	100	6	120_Large		5
Cicer arietinum	chickpea	Fabaceae	Dicots	28	prolate	120	50	5	120_Large		6
Cichorium endivia	endive	Asteraceae	Dicots	80-100	round spiny	250	150	6	250_Medium		4
Cichorium intybus	chicory	Asteraceae	Dicots	40	round spiny	120/250	100	6	120_Large/250_Small		5
Cirsium vulgare	spear thistle	Asteraceae	Dicots	40	round spiny	120/250	100	6	120_Large/250_Small		5
Citrullus lanatus	water melon	Cucurbitaceae	Dicots	60x60 - 60x60	prolate	250	150	11	250_Medium		8 / 5
Citrus x limonia	rangpur	Rutaceae	Dicots	35	round	120	50	6	120_Large		5
Citrus x sinensis	orange	Rutaceae	Dicots	32	round	120	50	6	120_Large		5
Clematis cultivars	clematis	Ranunculaceae	Dicots	28	round	120	50	6	120_Large		
Clematis vitalba	old man's beard	Ranunculaceae	Dicots	21	round	80/120	50	6	80_Large/120_Small		
Coffea arabica	coffee	Rubiaceae	Dicots	36	round	120	50	6	120_Large		10
Colutea arborescens	bladder-senna	Fabaceae	Dicots	38	triangular	120	50	5	120_Large		6
Coriandrum sativum	coriander	Apiaceae	Dicots	15x30	prolate	80/120	50	6	80_Large/120_Small		
Cornus sanguinea	common dogwood	Cornaceae	Dicots	58	round	250	100	6	250_Small		
Cortaderia selloana	pampas grass	Poaceae	Monocots	50	round	250	100	6	250_Small		
Corydalis solida	fumewort	Fumariaceae	Dicots	31	round	120	50	6	120_Large		
Corylus avellana	hazelnut	Corylaceae	Dicots	20 - 30	round	80	50	6	120_Small		5
Couroupita guianensis	cannonball tree	Lecythidaceae	Dicots	20x50	triangular	120	100	6	120_Large		5
Cucumis melo	melon	Cucurbitaceae	Dicots	50	round	250	150	11	250_Medium	msp_120_large	8 / 5
Cucumis sativus	cucumber	Cucurbitaceae	Dicots	60	round	250	150	11	250_Medium	msp_120_large	8 / 5
Cucurbita maxima	squash, pumpkin	Cucurbitaceae	Dicots	150-200	round spiny	400	300	8	400_Large	msp_250_large	11 / 8
Cucurbita moschata	butternut squash	Cucurbitaceae	Dicots	150-200	round spiny	400	300	8	400_Large	msp_250_large	11 / 8
Cucurbita pepo	courgette, marrow, zucchini	Cucurbitaceae	Dicots	150-200	round spiny	400	300	8	400_Large		11 / 8
Cuphea hyssopifolia	false heather	Lythraceae	Dicots	22	round	80	50	6	120_Small		
Cyclamen persicum	cyclame	Primulaceae	Dicots	15-20	round	80	50	6	120_Small	msp_120_small	4
Cynara cardunculus	artichoke	Asteraceae	Dicots	65	round spiny	250	100	6	250_Small		4 / 11
Daboecia cantabrica	St. Dabeoc's heath	Ericaceae	Dicots	30	tricolpat	120	50	6	120_Large		5
Dahlia cultivars	dahlia	Asteraceae	Dicots	45	round spiny	250	100	6	250_Small		5
Daucus carota	carrot	Umbelliferae	Dicots	15x30	prolate	120	50	10	120_Small		4 / 6
Delonix regia		Fabaceae	Dicots	60	round	250	100	6	250_Small		11
Delosperma	ice plant	Aizoaceae	Dicots	20	round	80	50	5	120_Small		6
Delphinium spec		Ranunculaceae	Dicots	24-33	round	120	50	6	120_Large		
Dianthus cultivars	pink	Caryophyllaceae	Dicots	30 - 50	round	120	100	6	120_Large		5
Diascia barberae	twinspur	Scrophulariaceae	Dicots	18-22	polygonal	80/120	50	6	80_Large/120_Small		
Digitalis lutea	straw foxglove	Plantaginaceae	Dicots	26	round	120	50	6	120_Large		
Digitalis purpurea	foxglove	Plantaginaceae	Dicots	26	round	120	50	6	120_Large		
Echinaceae spec	coneflower	Asteraceae	Dicots	35	round spiny	120	50	6	120_Large		
Echium vulgare	blueweed	Boraginaceae	Dicots	17	round	80	50	6	80_Large		
Elaeis guineensis	oil palm	Arecaceae	Monocots	30	triangular	120	50	6	120_Large		
Erica gracilis	heath	Ericaceae	Dicots	30-40	tetrate	120	100	5	120_Large		
Erigeron karvinskianus	Mexican fleaban	Asteraceae	Dicots	25	round spiny	120	50	6	120_Large		
Eruca sativa	rucola	Brassicaceae	Dicots	20	triangular	80/120	50	10	80_Large/120_Small		

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Erysimum cheiri	wallflower	Brassicaceae	Dicots	32	round	120	50	10	120_Large		
Eucalyptus spec	Eucalyptus	Myrtaceae	Dicots	26	triangular	120	50	6	120_Small		
Euphorbia verrucosa	spurge	Euphorbiaceae	Dicots	50	round	250	100	6	250_Small		
Eustoma	prairie gentian	Gentianaceae	Dicots	30	round	120	50	6	120_Large		
Fagopyrum esculentum	buckwheat	Polygonaceae	Dicots	50	round	120/250	100	6	250_Small		
Fagus sylvatica	common beech	Fagaceae	Dicots	50	round	120/250	100	6	250_Small		
Festuca arundinacea	tall fescue	Poaceae	Monocots	40	round	120/250	100	6	250_Small		11
Ficaria verna	pilewort	Ranunculaceae	Dicots	33	round	120	50	6	120_Large		
Foeniculum vulgare	florence fennel	Umbelliferae	Dicots	15x30	prolate	120	50	6	120_Large		4 / 10
Forsythia intermedia	Forsythia	Oleaceae	Dicots	25-30	round	120	50	6	120_Large		5
Fragaria magna	strawberry	Rosaceae	Dicots	25	triangular	120	50	6	120_Small		
Fragaria vesca	strawberry	Rosaceae	Dicots	23	triangular	80/120	50	6	120_Small		
Fraxinus excelsior	ash	Oleaceae	Dicots	22	triangular	80/120	50	6	120_Small		
Fraxinus ornus	flower ash	Oleaceae	Dicots	22	triangular	80/120	50	6	120_Small		
Gaillardia	blanket flower	Asteraceae	Dicots	30	round spiny	120	50	6	120_Large		
Gaura lindheimeri	gaura	Onagraceae	Dicots	150	triangular	400	200	11	400_Large		6
Gazania spec	ganzania	Asteraceae	Dicots	30 - 40	round textured	120	100	6	120_Large		5
Gentiana angustifolia	gentian	Gentianaceae	Dicots	35-40	round	120	100	6	120_Large		
Geranium spec	cranesbill	Geraniaceae	Dicots	70-120	round	250	150	5	250_Large		8
Gerbera spec	gerbera	Asteraceae	Dicots	50	round spiny	250	100	5	250_Small		6
Gladiolus x hortulanus	gladiolus	Iridaceae	Monocots	80	round	250	150	11	250_Medium		6
Gloriosa superba	flame lily	Colchicaceae	Dicots	40	prolate	120	100	6	120_Large		
Glycine max	soy bean	Fabaceae	Dicots	20	round	120	50	6	120_Small		5
Gossypium spec.	cotton	Malvaceae	Dicots	100+	round spiny	250/400	200/300	11	250_Large/400_Small		6
Guizotia abyssinica	noog, ramtilla	Asteraceae	Dicots	30	round spiny	120	50	6	120_Large		
Helianthus annuus	sunflower	Asteraceae	Dicots	45	round spiny	120	100	10	120_Large		6
Helleborus spec	christmas rose	Ranunculaceae	Dicots	25 - 40	triangular	120	50	6	120_Large		4
Hemerocallis	spider lily	Amaryllidaceae	Monocots	80	round	250	150	6	250_Small		11
Heptacodium miconioides	seven-son flower	Caprifoliaceae	Dicots	64	triangular	250	100	6	250_Small		
Hibiscus syriacus	hibiscus	Malvaceae	Dicots	150-200	round spiny	400	300	8	400_Large		5
Hippeastrum gracilis	amaryllis	Amaryllidaceae	Monocots	90	round	250	150	6	250_Large		
Hordeum vulgare	barley	Poaceae	Monocots	45	round	250	100	11	250_Small		6
Hyacinthus orientalis	hyacinths	Asparagaceae	Monocots	40-60	prolate	250	100	6	250_Small		4
Hydrangea macrophylla	hydrangea	Hydrangeaceae	Dicots	20	round	80	50	5	120_Small		6
Hydrangea paniculata	hydrangea	Hydrangeaceae	Dicots	20	round	80	50	5	120_Small		6
Hypericum	St John's wort	Guttiferae	Dicots	20 - 25	round	120	50	6	120_Small		
Ilex aquifolium	holly	Aquifoliaceae	Dicots	35	round	120	50	6	120_Large		
Iberis sempervirens	evergreen candytuft	Brassicaceae	Dicots	25	round	120	50	10	120_Small		
Impatiens walleria	Impatiens	Balsaminaceae	Dicots	46	prolate	250	100	6	250_Small		5
Impatiens x neuguninea	Impatiens	Balsaminaceae	Dicots	20x60	prolate	120/250	100	6	120_large/250_Small		5
Ipomoea spec		Convolvulaceae	Dicots	110-130	round	250	150	6	250_Large		
Juglans regia	walnut	Juglandaceae	Dicots	40	round	120	100	6	120_Large		
Justicia adhatoda	Malabar nut	Acanthaceae	Dicots	20x50	prolate	120	100	6	120_Large		
Kalanchoe blossfeldiana	flaming Katy	Crassulaceae	Dicots	33	triangular	120	50	6	120_Large		
Kolkwitze amabilis	beauty bush	Caprifoliaceae	Dicots	52	triangular	250	100	6	250_Small		
Lactuca sativa	lettuce	Astereaceae	Dicots	30	round spiny	120	50	6	120_Large		
Lagerstroemia indica	crepeflower	Lythraceae	Dicots	30	prolate	120	50	6	120_Large		
Lamium galeobdolon	yellow archangel	Lamiaceae	Dicots	28	round	120	50	6	120_Large		

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Lampranthus spec		Aizoaceae	Dicots	20	round	80	50		6	120_Small	
Larix	larch	Pinacea	Pinopsida	40-60	spherical	250	100		6	250_Small	
Lavandula officinalis	lavender	Lamiaceae	Dicots	40	prolate	120	100		6	120_Large	5
Lens culinaris	lentile	Fabaceae	Dicots	25	prolate	120	50		5	120_Small	6
Leucanthemum vulgare	oxeye daisy	Asteraceae	Dicots	30	round spiny	120	50		6	120_Large	5
Lilium spec	lily	Liliaceae	Monocots	100	prolate	250	150		11	250_Large	6
Lolium multiflorum	Italian rye-grass	Poaceae	Monocots	40	round	250	100		6	250_Small	11
Lolium perenne	German rye-grass	Poaceae	Monocots	40	round	250	100		6	250_Small	11
Magnifera indica	mango	Anacardiaceae	Dicots	25-35	triangular	120	50		6	120_Large	
Magnolia x soulangiana	magnolia	Magnoliaceae	Magnoliids	65	prolate	250	100		5	250_Medium	6
Malus domestica	apple	Rosaceae	Dicots	38	round	120	50		6	120_Large	5
Malva sylvestris	mallow	Malvaceae	Dicots	130	round, spiny	400	200		11	400_Small	6
Mandevilla	rocktrumpet, Dipladenia	Apocynaceae	Dicots	55	round	250	100		6	250_Small	
Matricaria chamomille	chamomilli	Asteraceae	Dicots	25	round, spiny	120	50		6	120_Small	5
Mentha suaveolens x piperita	mint grapefruit	Lamiaceae	Dicots	30-40	prolate	120	50		5	120_Large	6
Mentha x piperita	mint	Lamiaceae	Dicots	30-40	prolate	120	50		5	120_Large	6
Momordica spec	bittergourd	Cucurbitaceae	Dicots	80	round	250	150		5	250_Medium	8
Musa x paradisiaca	banana	Musaceae	Monocots	100-130	round	250	150		11	250_Large	6
Muscari armeniacum	grape hyacinth	Asparagaceae	Monocots	30	prolate	120	50		6	120_Large	
Narcissus minor	daffodil	Amaryllidaceae	Monocots	37	prolate	120	50		6	120_Large	4
Nepeta cataria	catnip	Lamiaceae	Dicots	36-44	elliptic	120	100		6	120_Large	
Nicotiana spec	tobacco	Solanaceae	Dicots	35	round	120	50		10	120_Large	6
Ocimum basilicum	basil	Lamiaceae	Dicots	60	round	250	100		6	250_Small	5
Oenothera biennis	evening primrose	Onagraceaea	Dicots	160	triangular	400	200		11	400_Large	6
Olea europaea	olive tree	Oleaceae	Dicots	25	triangular	120	50		6	120_Small	5
Ononis arvensis	field restharrow	Fabaceae	Dicots	20	prolate	80	50		5	120_Small	6
Oryza sativa	rice	Poaceae	Monocots	30-45	round	250	100		11	250_Small	6
Osteospermum spec		Asteraceae	Dicots	35	round spiny	120	50		6	120_Large	
Paeonia spec	peony	Saxifragaceae	Dicots	30	round	120	50		6	120_Large	
Papaver nudicaule	Island poppy	Papaveraceae	Dicots	35	round	120	50		6	120_Large	5
Passiflora edulis	passion flower	Passifloraceae	Dicots	40 - 70	polygonal	250	100		6	250_Small	
Pentas lanceolata	spruce	Rubiaceae	Dicots	24	tetracolpate	120	50		6	120_Small	
Persea amaricana	Avocado	Lauraceae	Dicots	20	round	80/120	50		6	80_Large/120_Small	3 / 10
Petroselinum crispum	parsley	Apiaceae	Dicots	23	prolate	120	50		6	120_Small	
Petunia spec	petunia	Solanaceae	Dicots	30	triangular	120	50		6	120_Large	10
Phacelia tanacetifolia	blue tansy	Boraginaceae	Dicots	24	round	120	50		6	120_Small	
Phalaenopsis	orchids	Orchidaceae	Dicots	15	round	80	50		6	80_Large	
Phaseolus vulgaris	bean	Fabaceae	Dicots	30-35	triangular	120	100		6	120_Large	5
Phlox paniculata	phlox	Polemoniaceae	Dicots	50	round	250	100		6	250_Small	
Phoenix dactylifera	date palm	Arecaceae	Monocots	10x15	prolate	80	50		6	80_Large	
Picea abies	pine	Pinacea	Pinopsida	60-100	bisaccate	250	150		11	250_Medium	6
Pinus sylvestris	pine	Pinacea	Pinopsida	60-100	bisaccate	250	150		11	250_Medium	6
Pistacia vera	pistachio	Anacardiaceae	Dicots	30	round	120	50		6	120_Large	4
Pisum sativum	pea	Fabaceae	Dicots	40 - 50	prolate	120	100		6	120_Large	4 / 5
Portulaca grandiflora	rose moss	Portulacaceae	Dicots	80	round	250	150		6	250_Medium	
Primula vulgaris (syn. acaulis)	primerose	Primulaceae	Dicots	15-20	round	80	50		6	80_Large	5
Prunus avium	cherry	Rosaceae	Dicots	40	triangular	120/250	100		6	120_Large/250_Small	
Prunus domestica	plum	Rosaceae	Dicots	44	triangular	120/250	100		6	120_Large/250_Small	

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Prunus dulcis	almond	Rosaceae	Dicots	32x55	prolate/tri	120/250	100	6	120_Large/250_Small		
Prunus laurocerasus	cherry laurel	Rosaceae	Dicots	43	prolate/tri	120/250	100	6	120_Large/250_Small		
Prunus serrulata	Japanese cherry	Rosaceae	Dicots	40	triangular	120/250	100	6	120_Large/250_Small		
Prunus spinosa	blackthorn	Rosaceae	Dicots	44	triangular	120/250	100	6	120_Large/250_Small		
Pulmonaria obscura	suffolk lungwort	Boraginaceae	Dicots	36	round	120	50	6	120_Large		
Pulmonaria officinales	lungwort	Boraginaceae	Dicots	36	round	120	50	6	120_Large		
Punica granatum	pomegranate	Lythraceae	Dicots	26	triangular	120	50	6	120_Large		
Pyrus communis	pear	Rosaceae	Dicots	32	triangular	120	50	6	120_Large		
Quercus robur	common oak	Fagaceae	Dicots	38	triangular	120	50	6	120_Large		
Ranunculus arvensis	corn buttercup	Ranunculaceae	Dicots	25	prolate	120	50	6	120_Large		5
Ranunculus asiaticus	persian buttercup	Ranunculaceae	Dicots	20 - 30	round	120	50	6	120_Large		5
Ranunculus ficaria	lesser celandine	Ranunculaceae	Dicots	33	prolate	120	50	6	120_Large		
Raphanus sativus oleiferus	radish	Brassicaceae	Dicots	25	prolate	120	50	10	120_Small	msp_120_small	
Raphanus sativus sativus	radish	Brassicaceae	Dicots	25	prolate	120	50	10	120_Small	msp_120_small	
Rheum rhabarbarum	rhubarb	Polygonaceae	Dicots	35	round	120	50	6	120_Large		5
Rhododendron	rhododendron	Ericaceae	Dicots	40 - 70	tetradae	250	100	6	250_Small		5
Ribes nigrum	blackcurrant	Grossulariaceae	Dicots	38	round	120	50	6	120_Large		
Ribes rubrum	redcurrant	Grossulariaceae	Dicots	33	round	120	50	6	120_Large		
Rosa canina	dogrose	Rosaceae	Dicots	40	round	120	100	6	120_Large		
Rosa chinensis	rose	Rosaceae	Dicots	35	round	120	50	6	120_Large		
Rosa indica	tearose	Rosaceae	Dicots	35	round	120	50	6	120_Large		
Rosa multiflora	multiflora rose	Rosaceae	Dicots	35	round	120	50	6	120_Large		
Rosmarinus officinalis	rosmarine	Lamiaceae	Dicots	45	prolate	120/250	100	5	120_Large/250_Small		6
Rubus fruticosus	blackberry	Rosaceae	Dicots	35	triangular	120	50	6	120_Large		
Rubus fruticosus x idaeus	tayberry	Rosaceae	Dicots	30	triangular	120	50	6	120_Large		
Rubus idaeus	raspberry	Rosaceae	Dicots	30	triangular	120	50	6	120_Large		
Rudbeckia hirta	rudbeckia	Asteraceae	Dicots	35	round spiny	120	50	6	120_Large		
Saccharum officinarum	sugarcane	Poaceae	Monocots	40-120	round	250	150	11	250_Small		6
Salix viminalis	basket willow, osier	Saliceae	Dicots	20	round	80	50	6	120_Small		5
Salvia farinaceae	sage	Lamiaceae	Dicots	30	prolate	120	50	6	120_Large		5
Salvia officinalis	sage	Lamiaceae	Dicots	45	prolate	120	100	6	120_Large		5
Salvia pratensis	meadow sage	Lamiaceae	Dicots	40 - 50	prolate	120/250	100	6	120_Large/250_Small		5
Sambucus nigra	elder	Caprifoliaceae	Dicots	22	round	120	50	6	120_Small		
Saxifraga rosacea	rockfoil	Saxifragaceae	Dicots	30	triangular	120	50	6	120_Large		5
Scilla siberica	squill	Asparagaceae	Monocots	50	prolate	250	100	6	250_Small		4
Secale cereale	rye	Poaceae	Monocots	50-60	prolate	250	100	6	250_Small	msp_120_large	11
Sedum multicolorum	stonecrop	Crassulaceae	Dicots	24	triangular	80	50	6	120_Small		
Sedum sieboldii	October stonecrop	Crassulaceae	Dicots	18	triangular	80	50	6	80_Large		
Silene dioica	red campion	Caryophyllaceae	Dicots	33	round	120	50	6	120_Large		
Silene vulgaris	bladder campion	Caryophyllaceae	Dicots	40 - 50	round	120/250	100	6	120_Large/250_Small		
Silybum marianum	cardus marianus	Asteraceae	Dicots	70	round	250	100	6	250_Medium		5
Sinapis arvensis	charlock mustard	Brassicaceae	Dicots	25	prolate	120	50	10	120_Small	msp_120_small	
Solanum lycopersicon	tomato	Solanaceae	Dicots	25	round	120	50	10	120_Small	msp_120_small	6
Solanum melongena	eggplant	Solanaceae	Dicots	25-30	round	120	50	10	120_Large	msp_120_small	6
Solanum quitoense	quito orange	Solanaceae	Dicots	25	round	120	50	10	120_Small	msp_120_small	6
Solanum tuberosum	potato	Solanaceae	Dicots	20	round	120	50	10	120_Small	msp_120_small	6
Sonchus arvensis	field milk thistle	Asteraceae	Dicots	40	round	120	100	6	120_Large		5
Sorghum bicolor	sorghum, dari	Poaceae	Monocots	40-50	round	250	100	11	250_Small	msp_120_large	6

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Spinacia oleracea	spinach	Amaranthaceae/C	Dicots	40	round	120/250	100	6	120_Large/250_Small		4
Spiraea cinera	meadowsweet	Rosaceae	Dicots	17	oblate/prolate	80	50	6	80_Large		
Spiraea japonica	meadowsweet	Rosaceae	Dicots	17	oblate/prolate	80	50	6	80_Large		
Styphnolobium japonicum	pagoda tree	Fabaceae	Dicots	17	round	80/120	50	6	80_Large/120_Small		
Syringa vulgaris	lilac	Oleaceae	Dicots	30	round	120	50	6	120_Large		5
Tagetes patula	marigold	Asteraceae	Dicots	45	round spiny	120	100	6	120_Large		5
Taraxacum officinale	dandelion	Asteraceae	Dicots	30	round spiny	120	50	6	120_Large		5
Theobroma cacao	cacao	Malvaceae	Dicots	20	round	80/120	50	6	80_Large/120_Small		
Thymus vulgaris	thyme	Lamiaceae	Dicots	35 - 45	prolate	120	100	6	120_Large		5
Tilia platyphyllos	largeleaf linden	Tiliaceae	Dicots	35	prolate	120	50	6	120_Large		5
Trifolium	clover	Fabaceae	Dicots	30	round	120	50	5	120_Large		6
Triticum spp.	wheat	Poaceae	Monocots	40 - 70	round	250	100	11	250_Small	msp_120_large	6
Tulipa cultivars	tulip	Liliaceae	Monocots	60	round	250	100	6	250_Small		4
Turnera diffusa	damiana	Passifloraceae	Dicots	30	round	120	50	6	120_Large		
Tussilago farfara	coltsfoot	Asteraceae	Dicots	36	round spiny	120	50	6	120_Large		
Ulmus glabra	wych elm	Ulmaceae	Dicots	32	round	120	50	6	120_Large		
Vaccinium spec	blueberry	Ericaceae	Dicots	30-40	tetrads	120	50	6	120_Large		5
Verbena hybrida	verbena	Verbenaceae	Dicots	30-40	triangular	120	50	6	120_Large		
Veronica chamaedrys	germander speedwell	Plantaginaceae	Dicots	33	triangular	120	50	6	120_Large		
Viburnum bodnantense	Bodnant viburnum	Adoxaceae	Dicots	22	round	120	50	6	120_Large		
Viburnum opulus	guelder-rose	Adoxaceae	Dicots	25	round	120	50	6	120_Large		5
Vicia faba	broad bean	Fabaceae	Dicots	50	prolate	120/250	100	5	120_Large/250_Small		
Vicia spec	vetches	Fabaceae	Dicots	30-40	round	120	50	5	120_Large		
Vicia villosa	winter vetch	Fabaceae	Dicots	35	prolate	120	50	5	120_Large		6
Vigna unguiculata	cow pea	Fabaceae	Dicots	60-70	round	250	100	6	250_Medium		5
Vinca spec.	vinca	Apocynaceae	Dicots	60-80	round	250	100	5	250_Medium		6
Viola cornuta	violet	Violaceae	Dicots	40	round	120/250	100	6	120_Large/250_Small		
Viola wittrockiana	violet	Violaceae	Dicots	70	round	250	100	6	250_Medium		
Vitex agnus-castus	chasteberry	Lamiaceae	Dicots	26-31	round	120	50	6	120_Large		
Vitis vinifera	grape	Vitaceae	Dicots	30	round	120	50	6	120_Large		
Weigela florida	weigela	Caprifoliaceae	Dicots	45	round	250	100	6	250_Small		
Wisteria sinensis	glycine	Fabaceae	Dicots	30	triangular	120	50	6	120_Large		5
Xanthoceras	Chinese chestnut, yellowhorn	Sapindaceae	Dicots	40	round	120/250	100	6	120_Large/250_Small		
Yucca spec	Yucca	Asparagaceae	Dicots	40	prolate	120/250	100	6	120_Large/250_Small		11
Zantedeschia aethiopica	calla	Araceae	Monocots	50	round	250	100	6	250_Small		
Zea mays	corn, maize	Poaceae	Monocots	80 - 120	round	250	150	11	250_Large	msp_250_small	6