2006-027: DRAFT ANNEX to ISPM 27– Sorghum halepense

Comm. no.	Para. no.	Comment type	Comment	Explanation	Country
1.	G	Editorial	It is recommended that this protocol paragraphs are numbered for clarity and document management.	Clarify	Costa Rica
2.	G	Substantive	I support the document as it is and I have no comments		Georgia, Singapore, New Zealand, Nepal, Mexico, Congo, South Africa, Barbados, Bahrain, Guyana, Belize, Ghana, Burundi
3.	G	Technical	1. We would like to request the TPDP to include in this diagnostic protocol the uncertainty level of each method described in section 4, if available, in order to know their level of analytical confidence. We would also like the TPDP to consider the possibility to include a comparative table containing all methods with their uncertainty levels. 2. We suggest the TPDP to reflect in this DP that morphological identification of seeds should be complemented by the morphological identification of plants as diagnostic confirmation test. 3. QBOL is a consortium of 20 partners (universities, research institutes and phytosanitary organizations) from all over the world working together and sharing their research expertise in the field of DNA barcoding of Arthropods, Bacteria, Fungi, Nematodes, Phytoplasmas and Viruses. Thereby, we would like to request the TPDP to evaluate the relevance to include this method in protocols.	See comment	Peru
4.	G	Technical	1. We would like to request the TPDP to include in this diagnostic protocol the uncertainty level of each method described in section 4, if available, in order to know their level of analytical confidence. We would also like	See comment	Argentina

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8.	*8*	Substantive	**1. Pest Information**	Reference to essential reviews on this pest are missing, e.g. Warwick et al. (1993) Canadian Journal of Plant Science 63: 997-1014.	EPPO
9.	*8*	Substantive	**1. Pest Information** Include information on seed description.	It would be helpful to include a brief description of the seed, including seed size under pest information. This will provide context for ‘Section 3.2. Sieve detection’.	Australia
10.	*8*	Substantive	**1. Pest Information**	References to essential reviews on this pest are missing, e.g. Warwick&Black (1983) Canadian Journal of Plant Science 63: 997-1014; Follak&Essl (2012) Weed Research 53(1):53-60.	European Union
11.	*9*	Editorial	*Sorghum halepense* (Johnsongrass) is a perennial grass with a ribbed leaf sheath, conspicuous midrib, large, purplish panicles, and far-reaching rhizomes (Figures 1 and 2[no space between]). It originated from the hybridization of *Sorghum arundinaceum* and *Sorghum propinquum* through chromosome doubling (chromosomes: 2n = 4x = 40) (Ng’uni et al., 2010). *S. halepense*which is native to the Mediterranean area (Meredith, 1955) and was introduced to India in the late	grammatical correction	Kenya

Comm. no.	Para. no.	Comment type	Comment	Explanation	Country
			1960s (Bor, 1960). It has become widespread, and is distributed from latitude 55° north to 45° south. It is best adapted to warm, humid areas with summer rainfall, areas with a high water table, and irrigated fields in subtropical zones. *S. halepense* is one of the most malignant weeds worldwide, impacting more than 30 cereal, vegetable and fruit crops (Holm *et al.*, 1977). It also threatens biodiversity in invaded habitats in no fewer than 50 countries in temperate and tropical areas throughout the world, including countries in which it is a native species (Holm *et al.*, 1977).		
12.	*9*	Substantive	*Sorghum halepense* (Johnsongrass) is a perennial grass with a ribbed leaf sheath, conspicuous midrib, large, purplish panicles, and far-reaching rhizomes (Figures 1 and 2). Its origin is uncertain, some authors suggest that it originated from the hybridization of *Sorghum arundinaceum* and *Sorghum propinquum* through chromosome doubling (chromosomes: 2n = 4x = 40) (Ng'uni et al., 2010). *S. halepense*which is native to the Mediterranean area (Meredith, 1955) and was introduced to India in the late 1960s (Bor, 1960). It has become widespread, and is distributed from latitude 55° north to 45° south. It is best adapted to warm, humid areas with summer rainfall, areas with a high water table, and irrigated fields in subtropical zones. *S. halepense* is one of the most malignant weeds worldwide, impacting more than 30 cereal, vegetable and fruit crops (Holm *et al.*, 1977). It also threatens biodiversity in invaded habitats (which ones and how) in no fewer than 50 countries in temperate and tropical areas throughout the world, including countries in which it is a native species (Holm *et al.*, 1977).	the origin of S. halepense is not as clear as suggested here. Another possibility supported by the cited study and Morden et al. 1990 is that one of the parent of Sorghum halepense is Sorghum bicolor. It could be useful to give precisions (citing references) : which habitats are concerned and where does this impact occur?	EPPO
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15.	9	Technical	*Sorghum halepense* (Johnsongrass) is a perennial grass with a ribbed leaf sheath, conspicuous midrib, large, purplish panicles, and far-reaching rhizomes (Figures 1 and 2). It originated from the hybridization of *Sorghum arundinaceum* and *Sorghum propinquum*	It is a bit strange to focus on India here since the species has become established in all the warm regions of the world as explained in the next sentence. Either remove India or give other countries and dates of introduction.	European Union

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16.	*10*	Editorial	The main factors affecting the pest risk of *S. halepense* are that it: (1) has a high reproductive capacity; (2) is an alternate host of numerous pathogen species; (3) has allelopathic effects in and toxicity to livestock (da Nobrega *et al*., 2006); (4) has developed resistance to a wide range of herbicide groups (Heap, n.d.); and (45) crosses with related species readily, which may produce more invasive hybrids and cause gene pollution of crop species (Arriola and Ellstrand, 1996).	Deltion of point (3): Is it normal/acceptable to make a direct reference to an animal health benefit in an ISPM?	EPPO
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18.	*10*	Substantive	The main factors affecting the pest risk of *S. halepense* are that it: (1) has a high reproductive capacity and the seeds have the characteristic of dormancy; (2)The Sorghum halepense has strong competition ability and cause great yield lost of crop;(3) is an alternate host of numerous pathogen species; (34) has allelopathic effects in and toxicity to livestock (da Nobrega *et al*.,	The inference ability and seed dormancy of weed are important factors deciding its harmful level and environmental fitness.	China

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			2006); (~~4~~5) has developed resistance to a wide range of herbicide groups (Heap, n.d.); and (~~5~~6) crosses with related species readily, which may produce more invasive hybrids and cause gene pollution of crop species (Arriola and Ellstrand, 1996).		
19.	*10*	Substantive	The main factors affecting the pest risk of *S. halepense* are that it: (1) has a high reproductive capacity; (2) is an alternate host of numerous pathogen species; (3) has allelopathic effects in and toxicity to livestock (da Nobrega *et al*., 2006); (4) has developed resistance to a wide range of herbicide groups (Heap, n.d.); and (5) crosses with related species readily, which may produce more invasive hybrids and cause gene pollution of crop species (Arriola and Ellstrand, 1996).	Suggest substituting the term "gene pollution" with "gene introgression" (stable transfer of genetic material from one species/variety/population to another). This process is well known within the genus Sorghum (commercial sorghum, Johnson grass, shatter cane, and others). Indeed, genetic material is transferred between commercial sorghum and Johnson grass (in both directions).	United States of America
20.	*10*	Technical	The main factors affecting the pest risk of *S. halepense* are that it: (1) has a high reproductive capacity; (2) is an alternate host of numerous pathogen species; (3) has allelopathic effects in and toxicity to livestock (da Nobrega *et al*., 2006); (4) has developed resistance to a wide range of herbicide groups (Heap, n.d.); and (5) readily crosses with related species (including crop species) ~~readily~~, which may result in ~~produce~~ more invasive hybrids or ~~and~~ cause gene pollution of crop species (Arriola and Ellstrand, 1996).	Improvements to the English and highlighting that direct hybridisation with crop species is a risk.	EPPO, European Union
21.	*10*	Technical	The main factors affecting the pest risk of *S. halepense* are that it: (1) has a high reproductive capacity; (2) is an alternate host of numerous pathogen species; (3) has allelopathic effects ~~in and toxicity to livestock~~ (da Nobrega *et al*., 2006); (4) has developed resistance to a wide range of herbicide groups (Heap, n.d.); and (5) crosses with related species readily, which may produce more invasive hybrids and cause gene pollution of crop species (Arriola and Ellstrand, 1996).	Toxicity to livestock is not a factor affecting the pest risk. According to section 2.3.1. of ISPM 11 consequences considered should result from effects on plants.	COSAVE, Argentina, Peru, Brazil, Uruguay, Chile, Paraguay
22.	*11*	Editorial	*S. halepense* is able to reproduce by rhizomes or seeds. ~~Fragments of its long, vigorous and highly adaptable~~ Rhizomes ~~rhizome system~~ readily sprout and can be distributed by tillage. An individual *S. halepense* plant is able to produce as many as 28 000 seeds in a	1) simplifiction of the English 2) Unnecessary wording. This is fairly basic biology and is applicable to any seed so does it really warrant specific mention?	EPPO

Comm. no.	Para. no.	Comment type	Comment	Explanation	Country
			growing season. These seeds are able to survive and germinate under most environmental conditions. ~~Seed reproduction may generate diverse ecotypes that are distinct in morphology, anatomy and physiology.~~		
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24.	*12*	Editorial	Seeds are the main means of spread of *S. halepense*, and they are readily distributed by wind and water as well as by birds and other animals. More importantly, ~~the~~ seeds are frequently disseminated as a contaminant of commodities traded around the world; in particular, crop seeds and raw grains, such as *Sorghum bicolor* (sorghum), *Glycine max* (soybean), *Zea mays* (maize), *Triticum aestivum* (wheat) and *Sesamum indicum* (sesame), as well as forage, *Gossypium* spp. (cotton) and birdseed mixes. Therefore, seed quarantine is key ~~the core task~~ for the control of *S. halepense*, and ~~which~~ requires ~~the prerequisite of~~ accurate detection and identification of seeds.	Improved clarity.	EPPO, European Union
25.	*12*	Technical	~~Seeds are the main means of spread of *S. halepense*, and they are readily distributed by wind and water as well as by birds and other animals. More importantly, the seeds are frequently disseminated as a contaminant of commodities traded around the world; in particular, crop seeds and raw grains, such as *Sorghum bicolor* (sorghum), *Glycine max* (soybean), *Zea mays* (maize), *Triticum aestivum* (wheat) and *Sesamum indicum* (sesame), as well as forage, *Gossypium* spp. (cotton) and birdseed mixes. Therefore, seed quarantine is the core task for the control of *S. halepense*, which requires the prerequisite of accurate detection and identification.~~	This paragraph is not related to pest identification and additionally may lead to the idea that it will be always necessary to establish measures for this pest even without an appropriate technical justification.	COSAVE, Argentina, Peru, Brazil, Uruguay, Chile, Paraguay

<table>
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<tr><td>26.</td><td>15</td><td>Editorial</td><td>Synonyms: Holcus halepensis L., 1753</td><td>Put the synonyms in alphabetical order unless there is a specific reason why they are not already (e.g. by how commonly they are used.)</td><td>EPPO, European Union</td></tr>
<tr><td>27.</td><td>16</td><td>Technical</td><td>~~Sorghum miliaceum (Roxb.) Snowden, 1955~~</td><td>Sorghum miliaceum is not a synonym of Sorghum halepense. In fact, they are different species.</td><td>Thailand</td></tr>
<tr><td>28.</td><td>17</td><td>Technical</td><td>~~Andropogon miliaceus Roxb., 1820~~</td><td>Andropogon miliaceus is not a synonym of Sorghum halepense. In fact, they are different species. Andropogon miliaceus is a synonym of Sorghum miliaceum.</td><td>Thailand</td></tr>
<tr><td>29.</td><td>18</td><td>Technical</td><td>~~Sorghum controversum (Steud.) Snowden, 1955~~</td><td>Sorghum controversum is not a synonym of Sorghum halepense. In fact, they are different species.</td><td>Thailand</td></tr>
<tr><td>30.</td><td>19</td><td>Technical</td><td>~~Andropogon controversus Steud., 1854~~</td><td>Andropogon controversus is not a synonym of Sorghum halepense. In fact, they are different species. Andropogon controversus is a synonym of Sorghum controversum.</td><td>Thailand</td></tr>
<tr><td>31.</td><td>29</td><td>Editorial</td><td>Identification of S. halepense is commonly based on morphology. For suspected seeds with intact glumes and upper lemmas, morphological identification methods (section 4.1) are reliable. However, the fruits and seeds collected may be incomplete and parts of their characters unclear. In such cases, molecular (section 4.2) or biochemical (section 4.3) identification methods may need to be used. Seeds may also be sown and grown into seedlings and then mature plants ~~that~~ can be morphologically (section 4.4) or cytologically (section 4.5) examined for taxonomic traits and subsequently identified. Figure 4 presents a flow diagram for the identification of S. halepense.</td><td>Editorial correction.</td><td>COSAVE, Argentina, Peru, Brazil, Uruguay, Chile, Paraguay</td></tr>
<tr><td>32.</td><td>30</td><td>Editorial</td><td>S. halepense is prone to be confused with five related species in the genus Sorghum:</td><td>Put the five species into alphabetical order unless there is a specific reason why they are not already.</td><td>EPPO, European Union</td></tr>
<tr><td>33.</td><td>41</td><td>Editorial</td><td><table><tr><th>Species</th><th>Sessile spikelet</th><th>Caryopsis</th><th>Weight of 1 000 seeds (g, approximate)</th></tr><tr><td>S. halepense</td><td>Oval, (3.8) 4–5 (6.5~~5.6~~) mm in length,</td><td>Dark brown, obovate, 2.6–3.2 mm in length</td><td>4.9</td></tr></table></td><td>According to the Barkworth, M.E. (2013), sessile spikelet bisexual is 3.8-6.5 mm long, 1.5-2.3 mm wide.</td><td>Japan</td></tr>
</table>

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<tr><td></td><td>appressed pubescent</td><td>and 1.5–1.8 mm in width</td><td></td></tr>
<tr><td>S. × almum</td><td>Oval to oblong, 4.5–6 mm in length, short pubescent</td><td>Red–brown, broadly ovate or oval, 3.3–4 mm in length and 2–2.3 mm in width</td><td>6.6</td></tr>
<tr><td>S. propinquum</td><td>Oval to oblong , 3.8–4.5 mm in length, bearded</td><td>Brown, broadly ovate or broadly oval, approximately 2 mm in length and 1.5 mm in width</td><td>3.8</td></tr>
<tr><td>S. sudanense</td><td>Oval, (5) 6–8 mm in length, sparsely pubescent</td><td>Red–brown, broadly ovate, 3.5–4.5 mm in length, 2.5–2.8 mm in width</td><td>10–15</td></tr>
<tr><td>S. bicolor</td><td>Elliptic to oblongor ovate, (3) 4.5– 6 (9) mm in length, densely hispid, or pubescent to glabrous</td><td>Pink to red–brown, ovate, 3.5–4 mm in length, 2.5–3 mm in width</td><td>>20</td></tr>
<tr><td>Sorghum spp. hybrid cv. Silk</td><td>Oval, approximately 3.8 mm in length, short pubescent</td><td>Yellow or yellow–brown, broadly ovate, 2.5–4 mm in length and 1.7–2.5 mm in width</td><td>4.2</td></tr>
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</td><td>Oval means the width over one-half of the length. Based on the samples and pictures of S. halepense, also based on some relative references(Flora of China Editorial Committee. 2013. Poaceae Flora of China, 22 URL: http://foc.eflora.cn/content.aspx?TaxonId=130722), the sessile</td><td>China</td></tr>
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<tr><td>S. halepense</td><td>~~Oval~~elliptic or ovate, (3.8) 4–5 (5.6) mm in length, appressed pubescent</td><td>Dark brown, obovate to elliptic, 2.6–3.2 mm in length and 1.5–1.8 mm in width</td><td>4.9</td></tr>
<tr><td>S. × almum</td><td>elliptic to oblong~~Oval to oblong,~~ 4.5–6 mm in length, short pubescent</td><td>Red–brown, broadly ovate or oval, 3.3–4 mm in length and 2–2.3 mm in width</td><td>6.6</td></tr>
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</td><td>spikelet of S. halepense is not oval in most cases. For the same reasons, some morphological descriptions of other species ere been suggested to confirm and revise.</td><td></td></tr>
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</td><td>For sessile spikelet, it would be useful to provide length and width. According to Flora of North America, the length of sessile spikelet for S. halapense can reach 6.5 mm. For S. x almum, S. propinquum and S. bicolor, Clayton et al. (2006) provide higher value. Clayton, W.D., Vorontsova, M.S., Harman, K.T. and Williamson, H. (2006 onwards). GrassBase - The Online World Grass Flora. http://www.kew.org/data/grasses-db.html.</td><td>EPPO, European Union</td></tr>
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<table>
<tr><td></td><td>densely hispid, or pubescent to glabrous</td><td></td><td></td></tr>
<tr><td>Sorghum spp. hybrid cv. Silk</td><td>Oval, approximately 3.8 mm in length, short pubescent</td><td>Yellow or yellow–brown, broadly ovate, 2.5–4 mm in length and 1.7–2.5 mm in width</td><td>4.2</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>36.</td><td>44</td><td>Technical</td><td>
<table>
<tr><th>Glume</th><th>Lower glume</th><th>Upper glume</th><th>Upper lemma</th><th></th></tr>
<tr><td>S. halepense</td><td>Subleathery~~Leathery~~, tawny, red–brown, or purple–black</td><td>Apex clearly tridenticulate, 5–7-veined, dorsum ciliary but the rest glabrous</td><td>3-veined</td><td>Triangular lanceolate, apex bilobed and awned or not; awn 10–16 mm</td></tr>
<tr><td>S. × almum</td><td>Chartaceous or subleathery, dark brown</td><td>Apex little tridenticulate, 5–7-veined, dorsum ciliary but the rest glabrous</td><td>3-veined</td><td>Lanceolate, apex obtuse or slightly acute, bilobed, awned; awn approximately 15 mm</td></tr>
<tr><td>S. propinquum</td><td>Subleathery, dark brown with inconspicuous crossveins</td><td>9–11-veined, apex acute to apiculate or tridenticulat</td><td>7-veined</td><td>Lanceolate, approximately 3.5 mm in length,</td></tr>
</table>
</td><td>The glume of S. halepense is subleathery. And the upper lemma of S. sudanense is ovate or elliptic. Based on some relative references(Flora of China Editorial Committee. 2013. Poaceae Flora of China, 22 URL: http://foc.eflora.cn/content.aspx?TaxonId=130722), some morphological descriptions of the two species ere suggested to confirm and revise.</td><td>China</td></tr>
</table>

<table>
<tr><th>Comm. no.</th><th>Para. no.</th><th>Comment type</th><th>Comment</th><th>Explanation</th><th>Country</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>e, pubescent</td><td></td><td>acute or emarginate, awnless</td></tr>
<tr><td>S. sudanense</td><td>Leathery, lemon yellow to red–brown</td><td>Apex bidenticulate, 11–13-veined, usually with crossveins, dorsum short ciliary</td><td>5–7-veined, with crossveins</td><td>ovate or ellptic~~Ovate or oval~~, apex bilobed, awned; awn 10–16 mm</td></tr>
<tr><td>S. bicolor</td><td>Leathery, pink to red–brown</td><td>Apex acute or tridenticulate, 12–16-veined with crossveins, dorsum dense ciliary</td><td>7–9-veined</td><td>Lanceolate to long oval, 2–4-veined, apex bilobed, awned; awn approximately 1 mm</td></tr>
<tr><td>Sorghum spp. hybrid cv. Silk</td><td>Leathery, tawny, red–brown or purple–black</td><td>Apex little tridenticulate, 5–7-veined, dorsum ciliary but the rest pubescent</td><td>3-veined</td><td>Broad lanceolate, apex slightly bilobed, awnless</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>37.</td><td>60</td><td>Editorial</td><td>In this diagnostic protocol, methods (including reference to brand names) are described as published, as these defined the original level of sensitivity, specificity and/or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. ~~(~~This information is given for the convenience of users of this protocol and does not</td><td>Delete unnecessary brackets</td><td>Canada</td></tr>
</table>

Comm. no.	Para. no.	Comment type	Comment	Explanation	Country
			constitute an endorsement by the CPM of the chemical, reagent and/or equipment named~~.)~~. Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.		
38.	60	Technical	In this diagnostic protocol, methods (including reference to brand names) are described as published, as these defined the original level of sensitivity, specificity and/or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. (This information is given for the convenience of users of this protocol and does not constitute an endorsement by the CPM of the chemical, reagent and/or equipment named.). Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated. Under certain circumstances, seedling from seed samples may also be used to extract DNA。	If there is only a small number of seeds and they are vigorous, the quality of DNA exctracted from seedlings is relatively higer than only from seeds.	China
39.	60	Technical	In this diagnostic protocol, methods (including reference to brand names) are described as published, as these defined the original level of sensitivity, specificity and/or reproducibility achieved. ~~The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. (This information is given for the convenience of users of this protocol and does not constitute an endorsement by the CPM of the chemical, reagent and/or equipment named.).~~ Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.	Texted deleted and included in the footnote as previously agreed.	COSAVE, Argentina, Peru, Brazil, Uruguay, Chile, Paraguay
40.	62	Substantive	For DNA extraction from seed samples, refer to the source paper of the molecular method for the specific technique used (Chen et al., 2009). The method described by Moller *et al.* (1992) is recommended for DNA microextraction from seeds of *Sorghum* species. Laboratories may find that alternative DNA extraction techniques work equally well. If more than one seed is	if it is possible, it would be better if there are included recomended method for DNA extraction, for guidelines to conduct appropriate DNA extraction especially for this species	Indonesia

Comm. no.	Para. no.	Comment type	Comment	Explanation	Country
			included in the extraction, the DNA may comprise a mixture of species. Note: it would be better if there are recomended protocol for DNA extraction for this guidelines		
41.	*106*	Technical	**4.4 Morphological identification of plants**	It would be useful to have some estimated timeframes to reach different growth stages.	Australia
42.	*110*	Technical	**Mature plant:** Perennial with vigorous, spreading rhizomes. Culms 0.5–1.5 (–3~~2~~.0) m tall, 4–6 (–20) mm in diameter; nodes puberulous. Leaf sheaths glabrous; leaf blades linear or linear-lanceolate, (10–) 25–80 (–90) × (0.5~~8~~–) 1–4 cm, glabrous; ligule 0.5–1 (2–6) mm, glabrous ciliolate membrane.	Change of mimum or maximum size acoording to Clayton et al. (2006).	EPPO
43.	*110*	Technical	**Mature plant:** Perennial with vigorous, spreading rhizomes. Culms 0.5–1.5 (–3~~2~~.0) m tall, 4–6 (–20) mm in diameter; nodes puberulous. Leaf sheaths glabrous; leaf blades linear or linear-lanceolate, (10–) 25–80 (–90) × (0.5~~8~~–) 1–4 cm, glabrous; ligule 0.5–1 (2–6) mm, glabrous ciliolate membrane.	Change of minimum or maximum size according to Clayton et al. (2006).	European Union
44.	*111*	Technical	**Inflorescence:** Panicle lanceolate to pyramidal in outline, (10–) 20–40 (–55~~0~~) cm, soft white hairs in basal axil; primary branches solitary or whorled, spreading, lower part bare, upper part branched, the secondary branches tipped by racemes; racemes fragile, composed of (1–) 2–5 spikelet pairs.	Maximum size changed according to Clayton et al. (2006).	EPPO, European Union
45.	*112*	Technical	**Spikelet:** Usually in pairs although towards the tip of the inflorescence they may occur in threes; when the spikelet is in pairs, the lower is sessile and perfect with the upper, pedicelled, narrow, long and stamen-bearing; when the spikelet is in threes, one is sessile and perfect, the others are pedicelled and staminate. Sessile spikelet elliptic, (3.8–) 4–5 (–6.5) mm; callus obtuse, bearded; subleathery~~lower glume leathery~~, often pale yellow or yellowish brown at maturity, shortly pubescent or glabrescent, 5–7-veined, veins distinct in upper part, apex tridenticulate; upper lemma acute and mucronate or bilobed and awned or not; awn 1–1.6 cm. Pedicelled	The glume of S. halepense is subleathery.	China

Comm. no.	Para. no.	Comment type	Comment	Explanation	Country
			spikelet staminate, narrowly lanceolate, (3.6–) 4.5–7 mm, often violet-purple.		
46.	*119*	Substantive	– Culm base 3–9 mm in diameter ***S. sudanense***	Sorghum bicolor subsp. arundinaceum (Desv.) de Wet & J.R. Harlan should be included in the key.	EPPO, European Union
47.	*145*	Technical	The mean fluorescence of nuclei is quantified using a flow cytometer (Coulter Electronics)[1] equipped with a water-cooled laser tuned at 514 nm and 500 mW. Fluorescence at >615 nm is detected with a photomultiplier screened by a long pass filter. The mean 2C DNA content of each target species is calculated by comparing its mean nuclear fluorescence with the mean nuclear fluorescence of an internal standard. Because of the variation of *Sorghum* DNA content, one of two different internal standards is used to avoid overlap of the standard and target species. One standard, *Arabidopsis thaliana* ecotype Columbia, has a genome size of 157 Mb or 1C = 0.16 pg. The DNA content of *A. thaliana* and *S. bicolo*r Tx623 (2C DNA content = 1.67 pg) is determined from 15 replicates of leaf samples from *S. bicolor* and *A. thaliana* Columbia. At least three replicates for each test sampleare analysed to obtain the mean DNA content (Price *et al*., 2005; Jessup *et al*., 2012).	The following footnote should be inserted: “The use of brand names of reagents, chemicals or equipment in this diagnostic protocol implies no approval of them to the exclusion of others that may also be suitable. This information is given for the convenience of users of this protocol and does not constitute an endorsement by the CPM of the chemical, reagent and/or equipment named. Equivalent products may be used if they can be shown to lead to the same results.	COSAVE, Argentina, Peru, Brazil, Uruguay, Chile, Paraguay
48.	*155*	Editorial	A request for a revision to a diagnostic protocol may be submitted by national plant protection organizations (NPPOs), regional plant protection organizations (RPPOs) or Commission on Phytosanitary Measures (CPM) subsidiary bodies through the IPPC Secretariat (ippc@fao.org), which will in turn forward it to the Technical Panel on Diagnostic Protocols (TPDP).	Add "A" at the beginning of the sentence.	Canada
49.	*164*	Editorial	**CSIRO.** 1978. *Sorghum* spp. hybrid (forage sorghum hybrids) cv. Silk. *Journal of the Australian Institute of Agricultural Science,* 44(3 and 4): 219–221.	Add a reference : Clayton, W.D., Vorontsova, M.S., Harman, K.T. and Williamson, H. (2006 onwards). GrassBase - The Online World Grass Flora. http://www.kew.org/data/grasses-db.html.	EPPO
50.	*164*	Editorial	**CSIRO.** 1978. *Sorghum* spp. hybrid (forage sorghum hybrids) cv. Silk. *Journal of the Australian Institute of Agricultural Science,* 44(3 and 4): 219–221.	Add a reference: Clayton, W.D., Vorontsova, M.S., Harman, K.T. and Williamson, H. (2006 onwards). GrassBase - The Online World Grass Flora. http://www.kew.org/data/grasses-db.html.	European Union