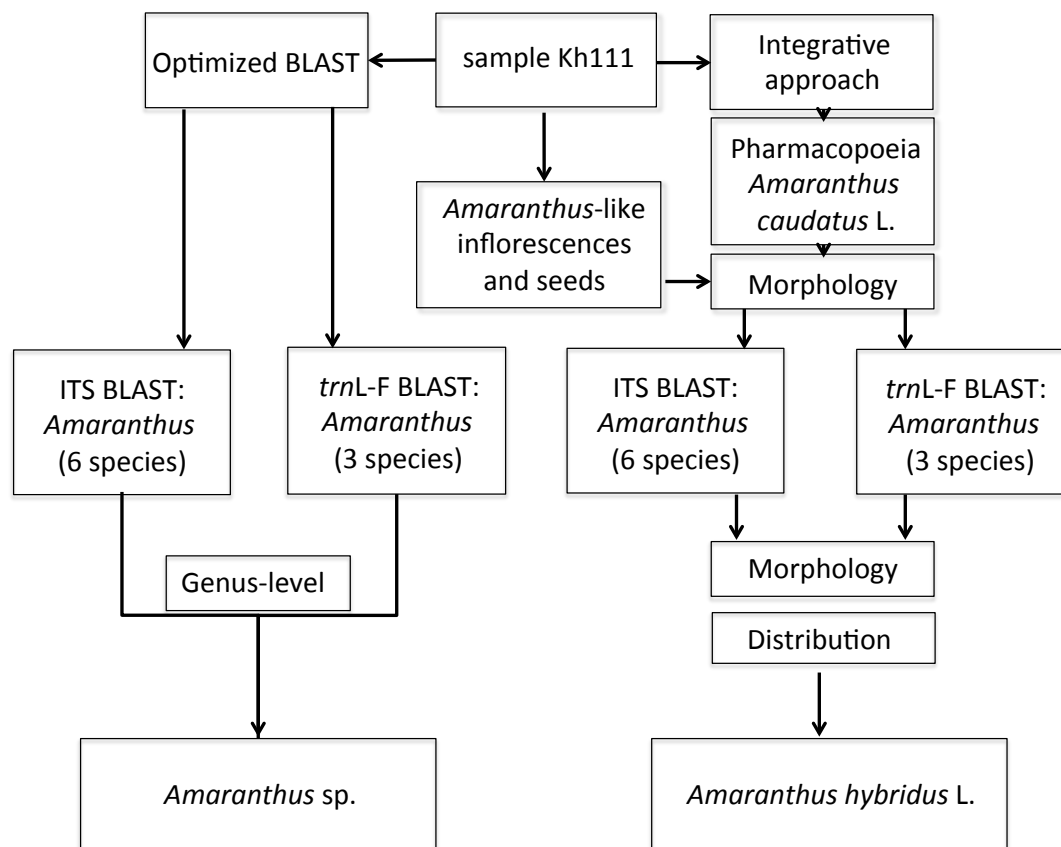


**S1 Text.** An example of the integrative approach advocated in this paper.



**Figure.** Diagram comparing the information and choice stream using the optimized BLAST and integrative approach.

**A priori data.** Sample Kh111 has the vernacular name “Taj khorroos” in Persian. According to the Iranian Herbal Pharmacopoeia (2002) this is the vernacular name for *Amaranthus caudatus* L. On the basis of inflorescence and seed morphology sample Kh111 was identified as a species of *Amaranthus* lacking spiny hairs. Ethnobotanical market data supports that the sample could be an *Amaranthus* species based on described morphology of the living material, growth habit and growing location.

**Simple BLAST sequence similarity matching.** In simple BLAST-based sequence matching, if there are two or more equally high-scoring hits within the same genus then only a genus level is assigned. All first hits within 10 max score points of each other were considered equally likely. Using the BLAST-based sequence matching approach the top scoring hits for this sample for the ITS amplicon was *Amaranthus hybridus* L. Whereas for trnL-F spacer, the amplicon was identified as *Amaranthus spinosus* L. As there was no consensus for

identification by both markers, it is considered as *Amaranthus* sp. for the combined ITS and trnL identification.

**Optimized BLAST sequence similarity matching.** For the optimized method a similarity score was calculated for each of the 100 BLAST hits if the query cover was 70% or higher:  $\text{max score} \times (\text{query cover} / \text{identity})$ . Subsequently all hits were ordered by this score, and the deviation for each similarity score value from the highest similarity score was calculated (Appendix S4). Identifications were assigned based on a combination of the identity score (High identity:  $i \geq 95\%$ ; Medium identity:  $90\% \leq i < 95\%$ ; Low identity:  $i < 90\%$ ) and the number of species within 1% deviation of the calculated similarity score: High identity and one species within 1% deviation -> species-level confidence; High and more than one species -> genus-level confidence; Medium identity and one or more species within the same genus -> genus-level confidence; Medium identity and species from more than one genus -> family-level confidence; Low identity -> family-level confidence. For Kh111 ITS there were 12 hits representing 6 species falling within the 1% deviation from top hit, all belonging to the genus *Amaranthus* and a genus level identification was assigned. For Kh111 trnL-F spacer there were 2 hits representing 2 species falling within the 1% deviation from top hit, both belonging to the genus *Amaranthus* and here too a genus level identification was assigned. The combined identification for both markers was *Amaranthus* sp.

**Integrative approach.** In the integrative approach one takes into account *a priori* data from morphological characteristics of the material, identifications based on available literature, and interview data on vernacular names along with *a posteriori* data from multiple molecular markers and data on traditional use, occurrence, and distribution of putative species in the study area. In this example, *a priori* data (see above) suggested *Amaranthus caudatus* L. based on literature, *Amaranthus* sp. based on ethnobotanical interview data and *Amaranthus* sp. without spiny hairs based on morphology. The BLAST hits suggested either *Amaranthus hybridus* L. (based on ITS) or *Amaranthus spinosus* L. (based on trnL-F spacer). *A posteriori* data gives two additional clues that aid the identification process: 1) Consulting the Flora of Iran and other literature shows us that *Amaranthus spinosus* L. does not occur in Iran; and 2) *Amaranthus spinosus* L. has spiny hairs on the inflorescence which are absent in this sample. As a result, using an integrative approach the identification of this sample is *Amaranthus hybridus* L.