

## **PLANT INFO: A Component of FAO's Global Plant and Pest Information System**

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In co-operation with a range of government and non-government institutions, FAO has established an international shared knowledge resource on technical information about plants and pests. This Global Plant & Pest Information System (GPPIS), is an Internet-based service for information access but also a process for harnessing global knowledge within a framework of standard procedures and protocols for data collection, verification, validation, and distribution, that are endorsed by participants. Implemented under the auspices of FAO, the GPPIS forum creates a dynamic framework for continuous collective knowledge processing within the sharing community. The Internet makes this possible because it distributes the task required to create a global resource, while concentrating and multiplying the benefits of collaboration. GPPIS can be implemented in a variety of cross-platform environments on the Internet, in local Intranets, but also as a complete Internet-equivalent system that runs on CD-ROM.

Plant Info, as integrated part of GPPIS, aims at developing and maintaining a platform (interactive compendium) for access to reliable information on crop production, designed to guide technical decisions within different agroecozones and production systems, for increased food security and sustainable agricultural development. Following the usual pattern of compendia, wherein a few scientists with expertise in a discrete set of specialized fields voluntarily devote their time to writing and illustrating crop data sheets or profiles, GPPIS is an Internet adapted dynamic, interactive, digital implementation of the same traditional approach. Specifically, individuals are invited and encouraged to participate in the GPPIS community by “adopting” a crop species, a discrete “layer” (topic) of information about plants, e.g. the “medicinal uses” layer of information associated with separate plant records, or simply by serving as public referees or scrutineers of information in the GPPIS knowledge commons. The main difference it is not a single, one-time, printed product that requires regular reprinting of new editions, but a permanently updated set of data managed by a set of methods and protocols for data collection and maintenance under password-protection.

Data quality in GPPIS is further managed in a variety of ways. Each record has a single primary editor: this editor receives a password which is required to edit or add data. Each record makes provision for a few “topic editors” to function as a small editorial committee to support and advice the primary editor. The information in GPPIS is displayed under the name and logo of the contributing author or institution, resulting in a public, transparent display of assumption of responsibility through volunteering expertise. Coupled to the continuous public scrutiny that characterizes the Internet, as well to GPPIS' procedures for immediate feedback by public viewers and users, data quality in GPPIS is controlled dynamically and in real-time. Finally, partnership program with key institutions who have a recognized role of knowledgeable authority in a particular group of records which are then “clustered” and presented under the banner and logo of that institution.

GPPIS data are in the public domain and not copy righted because its content is created and maintained by the community of individuals who choose to participate in the building of GPPIS. Data contribution by sponsors and supporters is voluntary and motivated by the realization that individuals sharing their individual expertise enables all participants to have access to the sum of their collective knowledge. Information is considered not as product but as advertising the expertise which the institution hopes to sell through service provision, in order to sustain its continued financial viability.

Apart from their individual significance, the main elements of GPPIS also produce interaction effects especially when considering supporting or ancillary information in GPPIS such as glossary of terms, bibliographic references, the picture databank and GPPIS-related methodologies. This leads to a quantitative synergy between separate data elements—an interaction that produces knowledge that is more than the sum of its individual information elements. GPPIS proposes unique and original procedures whereby users at the periphery of the GPPIS network and community can control the process of establishing hypertext links between discrete units of information that convey a message or “*memes*.” Each editor controls the hypertext linking process explicitly and thus GPPIS is a knowledge creation system as opposed to an information broadcasting

system. This original GPPIS' procedures that allow users to create "reverse" hypertext links led to participatory methods of knowledge building whereby users update and own the data.

FAO is fundamentally concerned about developing countries where Internet access is currently unavailable. Therefore, GPPIS was designed to be packaged also on CD-ROM (periodical snapshot) for independent local stand-alone or Intranet use. GPPIS will be distributed as regular, free CD-ROMS, and user connected to the Internet can, at any time, "switch" from local CD-ROM to current, real-time information on the Internet. Procedures are being developed to enable individuals to submit personal interest profiles that would filter and dispatch by E-mail information according to their specific needs. GPPIS is also a meeting point where specific subjects could be discussed among resource person groups (discussion forum), a location where specialized resource persons could be identified and where rapid information circulation and specialised advice on specific alert situations could be sourced.

The descriptions above provide the framework and values that inspire and sustain GPPIS. However, a summary like this cannot anticipate and address all the questions and misgivings that this example will stimulate. However, GPPIS exists and does answer them and readers are invited to visit the website at <http://pppis.fao.org>. A manual for GPPIS is available at this URL (Fig 1.). You are invited to join the GPPIS community by contributing information that makes you an individual expert—no matter how modest the contribution, because a snowstorm is made of many small flakes and we are changing the world of plant production and protection information, one person at a time.



Fig. 1. GPPIS homepage.

Appendix : Data areas & free form text guides in Plant Info for the Global Plant and Pest Information System (GPPIS).

Plant menu headings Information headings Sub-headings	Description of entries	Menu's with given values (all menu's under Ecocrop but "selected value" appear under the heading as shown)
<b>Identity</b>		
Logo	Taxonomy and introduction of the species and information on Editor and Sponsor The Sponsor Institution logo is usually an image about 20x20 pixels in .gif format. It can send to the GPPIS Supervisor as an e-mail attachment.	
Plant illustration	The Plant illustration is usually a black and white drawing, 100 pixels wide and about 5-13 Kbytes. It can be .gif or .jpg format and can be sent to the GPPIS Supervisor as an e-mail attachment.	
Preferred name	Scientific name (edited by the GPPIS Supervisor)	
GPPIS Code	Code used by the programme (generated by GPPIS)	
Authority	Taxonomic authority of the species	
Family	Taxonomic family of the species. If there is a synonym for the family name mention this after a " , e.g. Leguminosae, Fabaceae	
Synonyms	Taxonomic synonyms of the preferred name of the species	
Common names	Common names of the species in English first and there after in other languages. Note if possible languages (e.g. Fr.; French, Sp.; Spanish, Ge; German etc) or the country	
Editor	Editor name (edited by the GPPIS Supervisor)	
Sponsor	Sponsor name (edited by the GPPIS Supervisor)	
Topic editors	Topic editor names (edited by the GPPIS Supervisor)	
Life form	Life form of the species, value(s) selected under EcoCrop	
Habit	Growth habit of the species, value(s) selected under EcoCrop	Grass, herb, vine, sub-shrub, shrub, tree erect, prostrate/procumbent/semi-erect, climber/scramblet/scandent, rosette plant
Life span	Life span of the species, value(s) selected under EcoCrop	Ephemeral, annual, biennial, perennial
Category	Category of the species, value(s) selected under EcoCrop	Cereals & pseudocereals, pulses (grain legumes), roots/tubers, forage/pasture, fruit & nuts, vegetables, industrial, ornamentals/turf, medicinal & aromatic, forest/wood, cover
Plant attributes	Main attribute(s) of the species, value(s) selected under EcoCrop	Grown on large scale, grown on small scale, harvested from wild, previously widely grown, weed, parasite
Status	Present economical and social description of the species	
Overview	General importance of the species as text information and as value(s) selected under EcoCrop	
Role	General and specific roles of the species (and its comparative advantages) in agricultural and overall socio-economic development at farm and macro-economic level	

Production	Area cropped. Total and local production (primary and secondary products). World trade. Collaboration FAOSTAT, country or world production, economics etc. Production in main and secondary products. Cost/benefit analysis
Economics	General economics of crop production within specific production systems (at farm level)
Ethno-botany	Social and cultural importance of the species, beliefs, customs indigenous knowledge (IK)
Description	Physical and physiological description of the species. See also under Ecocrop
General	Short overview and description of appearance of the species. Including height & width (habit) of species at maturity or at any important state of development (or growth stages) Description of each item (Roots, Stems, etc.). If relevant, including special adaptations
Morphology	Root system of the plant
Roots	Stem(s) of the plant
Stems	Leaves of the plant
Leaves	Flowers of the plant
Flowers	Fruits of the plant
Fruits	Seeds of the plant
Seeds	Overview of major characteristics such as photosynthetic pathway (C3/C4), any important state of the plant development/growth, DM accumulation, N fixing ability and other main attributes
Physiology	The environmental requirements of the species including specific tolerances, susceptibilities and limitations. See also under Ecocrop
Environment	Geographical distribution. Overview of the distribution of the species by: - agro-ecological or agro-climatic zones, by vegetation type: phytogeographic zones, phytosociology, and by terrain and climatic seasons requirements
Habitat	Latitudinal range where in the species is found
Latitude	Altitudinal range, if possible describe the range within specific climatic zones
Altitude	Temperature range for growth, killing temperature, vernalisation requirements, frost tolerance, etc.
Temperature	Rainfall and/or irrigation range for growth.
Water	Radiation range and intensity for growth described in flux or as bright light, clear skies, overcast, light shade, etc.
Radiation	Short day, day neutral or long day plant
Range & intensity	Photoperiodism
Soil	Texture, depth, OM content, drainage, erosion susceptibility, etc. pH, fertility (CEC, exchangeable cations, Al/Mn), salinity, etc.
Physical	Other specific abilities, susceptibilities or tolerances such as response drought, trampling, flooding, fire, ability to compete with companion plants etc.
Chemical	Main cultivation practices are described within major production systems. For each item, factors such as requirements. methods, timing, equipment, material and labour input are considered, if relevant. Also regional/local practices are mentioned, if relevant
Notes	
Crop management	

Overview	Cultivation status (harvested from wild, grown on small scale, large scale) and short description of the crop cycle including its variability
Cropping systems	Main cropping patterns at farm level and their interaction with available resources and applied production technologies, within major farming systems
Land management	Site and crop selection (terrain, rotation, association) and soil conservation. Land preparation operations (clearing, leveling, anti-erosion measures, ploughing, harrowing, ridging). Erosion sustainability in relation to the cultivation practice of the crop. Alternatively, eg. in case of no tillage, indicate the real crop soil requirements such as well structured, no compactions, no clods or stones. Shaping of the surface —leveling, ridging, bedding, depending upon soil type, type of mechanization and water regime of the crop.
Propagation material	Type, size, quality, production, selection, preparation and storage of planting material. Plant nursery operations for the production of planting material.
Planting	General guidelines on planting dates, densities, planting methods within different cropping and production systems
Water management	Principles for crop irrigation (method, quantity and timing). Drainage and water conservation
Fertility management	Principles for fertility management (organic, mineral) related to crop production systems and environments. Ranges of nutritive elements requirements and exports, toxicity levels and symptoms
Weed control	Guidelines for integrated weed control practices including tolerance to herbicides. Mechanical, thermic, chemical; cultural practices, plant competition; influencing factors like way of planting—broadcast, drilled, row, split row.
Grazing management	Guidelines for the management of the species under grazing, including reaction to grazing pressure, persistence under grazing, any special grazing requirements.
Compatibility with other species	Ability of the species to combine with other pasture species to form persistent pasture under grazing, especially grasses with legumes and legumes with grasses.
Other crop management practices	General cultivation including: plant staking, pruning, training, thinning, fruit thinning defoliation, etc.
Pollination	Guidelines for the pollination of the species in different cultivation situations, pollination agents, etc.
Harvest	Harvest operations at field level: one stage harvest, two stage with in field drying or conditioning phase field drying or conditioning phase—depending on the mechanization level. Main harvest operations: picking/stripping, cutting/pulling, threshing, chopping, digging/uprooting—combinations possible dependence on level of mechanization. Yields (average and variability). Crop pre-treatment. Maturity and number of harvests, time range. Moisture content, Harvest index. Principal, secondary part to be harvested & residues (% , residues, use). Methodology and output per yield unit. Machinery type, setting, maintenance, energy type & units per yield. Separation

	of main produce and by-produce components (for example grain/straw) in the field. Transport: fresh produce, chopped produce, dried produce, compressed produce. Pre-cleaning type and output. Hazards.
R&D Notes	On-going research and development programmes for improved crop management and production technologies (ICM, others). Existing experiences with 0-tillage.
Crop improvement	Description of conservation status and improvement work for the species including cultivars
Genetic resources Variability & cultivars	Conservation in-situ, ex-situ, IUCN status and where to find genetic material Short description of major varieties and cultivars of the species. Sources for further information
R&D Notes	On-going breeding programmes including biotechnology for growth and productivity, resistance to pest and diseases and quality
Pest & Diseases Pest notes	Description of Pest and Diseases associated with the species Crop-specific pest issues such as economic importance /impact, specific crop management, interaction between crop ecology and local management. Crop-specific plant-pest relations including symptoms, dispersal and control measures within different agro-ecological environments, their importance/impact for each economically important pest. Technical options for the application of plant protection agents on different mechanization levels: manual, tractor, (airplane); accessibility, penetration, parts to be controlled with different pests. Note that any general information applicable across crops should be added to the concerned Pest records in Pest Info (send your contribution the pest Editor)
Pest list Products & Uses	List of pests and diseases associated with the species as presented under Pest Info Processing, storage, product characteristics, use, nutrition and research work in these fields for the species
Processing & storage	Methodologies and outputs for principal part processed and residues. Principal part processed and %, Residues% and use, Methodology and output per yield unit, Machinery type, setting, maintenance, Energy type & units per yield, Pre-packaging, Packaging, label standards, Quality standards, Transport, Shelf life, Hazards. Type of produce to be stored: "dead" (staple grain, straw, hay, leaves) or "living" (oxygen requirements) (seed grain, potatoes, fruit). Physical properties of the produce: grain, stalk, leaves, units, bulk. Method of conservation: controlled atmosphere, airtight, cooling, drying. On farm processing and cleaning operations, drying, conditioning, grading.
Product characteristics	Principal ingredients/composition of main and secondary products. Quality standards, labeling and major recorded hazards of fresh or transformed products/by-products
Wood properties Uses	Principal and secondary uses of primary or transformed products/by-products as text information. See also under EcoCrop
Nutrition Medicine	Major nutritional aspects Major medicinal aspects

Nutritional quality & animal production Toxicity	The nutritive value of the species in terms of digestibility and intake, proximate analysis, and the ability of the species to produce animal product in terms of meat, milk or fiber. Anti-nutritive factors which may be present in the species due to secondary compounds, fungal toxins, mineral disorders, or other anti-palatability factors.
R&D Notes	On-going research and developing programmes for improved transformation, storage technologies and crop alternative uses and product quality
Pictures	Picture, Author, Caption and Keywords (either selected among previously entered references or entered through: Resources—Picture Databank)
History	Origin, history and development of the species
Overview	Origin, history and development of the species as an overview
Event sequence	Development of the species as a sequence of events
Key references	Author(s), title, year and abstract of references of key importance (either selected among previously entered references or entered through: Resources—Bibliographic References)
Notes	Free form notes
Ecocrop	Data sheet description (environmental requirements, physical appearance, use and cultivation) of the species through selected values and numeric inputs.