World agriculture has progressed dramatically since early 1970s as a result of research and development based policy support. High yielding varieties and hybrids along with intensive inputs, particularly the chemical fertilizers, pesticides and water have resulted in such a phenomenal growth. Developing countries, being largely agriculture based economies, benefited substantially from these advancements achieving food self-sufficiency, improved rural incomes and higher overall economic growth. While the gains have been very impressive, the input intensive agriculture has resulted in some undesirable effects on the environment and the overall sustainability of the farming systems. Adverse effects of chemical pesticides have been reported on both the abiotic and biotic components of the environment. The former are exemplified by residues in soil, air, water, food etc. and the latter by phytotoxicity, residues, vegetation changes etc. in plants and physiological deformities, diseases, mortality, population changes, genetic disorders etc. in mammals, avian, insects and other organisms. Entry of pesticides into the food chain coupled with their bioaccumulation and biomagnifications trigger effects of unforeseen consequences. Chemicals like methyl bromide, chlorofluorocarbons etc. are established culprits for depletion of the ozone layer.

Indiscriminate use of fertilizers, particularly the nitrogenous, has led to substantial pollution of soil, air and water. Fertilizer contamination of ground waters has led to eutrophication of lake and river waters causing depletion of oxygen and even death of aquatic life, nitrate pollution, increased emissions of gaseous N and metal toxicities. The presence of nitrates in potable water has been blamed for health hazards such as birth defects, impaired nervous system, cancer and methaemoglobinemia (the blue baby syndrome).

With an increasing awareness about the harmful effects of synthetic plant protection and production agrochemicals, the demand for technologies and products based on biological processes has been increasing steadily worldwide. Biopesticides, comprising living organisms or natural products derived from them are exemplified by plants (ex. pyrethrum Chrysanthemum sp., neem Azadirachta or Melia sp. etc.), macrobials (ex. Trichogramma parasitoid-
protozoan, *Cryptolaemus montrouzieri*—a coccinellid predator etc.), microscopic animals (ex. nematodes), microorganisms including bacteria (ex. *Bacillus thuringiensis*), viruses (ex. nucleopolyhedrosis virus), fungi (ex. *Beauveria* sp.) and the transgenic plants containing a pest combating gene (ex. Bt cotton). Their key advantages include safety to mammals and other non-target organisms, environment compatibility, target specificity, lower exposure to pests, supplemental role to chemical pesticides enabling their use in integrated pest management and acceptability for use in organic agriculture. Similarly, biofertilizers, or bioinoculants comprise environment friendly microorganisms which are beneficial to agriculture to improve soil fertility or crop productivity. They supply nutrients (ex. nitrogen) as well as improve availability of the unavailable forms of certain others (ex. phosphorus) and are comprised by several bacteria, fungi, actinomycetes etc. *Rhizobia, Azotobacter, Azospirillum*, blue green algae, *Azolla* and phosphate solubilizers (several bacteria and fungi) are the key examples. Their role in supplementing nutrition makes them ideally suitable in integrated nutrient management systems.

In view of their several advantages, the demand for natural pesticides and fertilizers has been rising steadily. It is estimated that the total global market for synthetic pesticides which was valued at US$ 26.7 billion in 2005 will decline to US$ 25.3 billion in 2010. On the other hand, the global market for biopesticides will increase from US$ 672 million in 2005 to over US$ 1 billion in 2010. While Europe, at an average annual growth rate (AAGR) of 15 percent, is projected to lead the growth in biopesticide use, Asia will be no far behind with an average AAGR of 12 percent. Worldwide data for biofertilizer market are not available though the sale volume is estimated to be US$ 3 billion.

Organic farming, a production system that tends to skip the use of synthetic pesticides, fertilizers and other additives, relies heavily on biopesticides and biofertilizers. The current global market for organically raised agricultural products is valued at around US$ 30 billion with a growth rate of around 8 percent. Nearly 22 million hectares of land is now cultivated organically. The organic cultivation represents less than 1 percent of the world’s conventional agricultural production and about 9 percent of the total agricultural area. This only highlights the tremendous potential in the growth of biopesticides and biofertilizers.

While some Asian countries have made significant advances in the development and use of biopesticides and biofertilizers, their potential remains largely
underutilized with variable efforts and experiences in different countries. Several technological and policy gaps have been identified which need to be addressed. Inconsistency in efficacy; toxicology and general safety including allergic risks in inhaling proteinaceous materials; the required degree of stringency of regulation; location, characterization and indexing of agents and creation of repositories; characterization of agro-ecological conditions/regions for key traits and raising the threshold of desired traits; standard and stable products; quality control; matching performance with synthetics; bioprospecting and allied chemical profiling; scientifically sound use packages; well defined role in integrated pest and nutrient management systems; and joint use with the synthetics are some of the technological aspects. On the policy front, the role of biopesticides and biofertilizers in conventional production systems; technology transfers and promotional programs; rural production/multiplication systems; conservation of germplasm/agent; linkages for a sound use program; national and international linkages; simplified regulatory and registration procedures; media support; creation of data bank etc. deserve attention.

Keeping in view the potential of biopesticides and biofertilizers as an important component of sustainable agriculture particularly on small-farmer holdings, the Asia-Pacific Association of Agricultural Institutions (APAARI) in its Tenth General Assembly Meeting held on 20th October 2008 at Tsukuba recommended to organize an Expert Consultation on “Bio-pesticides and Bio-fertilizers” as a part of work plan for 2009. As a follow-up, the Steering Committee of Asia-Pacific Consortium on Agricultural Biotechnology (APCoAB), a main program of APAARI, in its meeting held on 30th January 2009 decided to hold the Expert Consultation in Taipei, as a part of the APAARI-Council of Agriculture, Taipei (COA) collaborative program. The representative of Director General, Department of International Affairs, COA attending the meeting as a Steering Committee member offered to host the meeting at Taiwan Agricultural Research Institute (TARI), Taichung. During an APAARI-COA meeting held on 23rd May 2009 in Taipei, it was decided to organize the Expert Consultation on 27th to 29th October 2009.

**Objectives of the Expert Consultation**

1. Review the current status of research, development and use of biopesticides and biofertilizers in agriculture at the regional and national level.
2. Develop consensus on place of biopesticides and biofertilizers in the conventional agricultural production systems and issues of quality
requirements, quality control, regulatory management, commercialization and marketing.

3. Identify the role of public and private sector organizations and public-private participation in promoting the use of bioagents in agriculture.

4. Promote stewardship, regional cooperation, public awareness and stakeholders’ participation.

5. Policy framework and advocacy for promotion of their use in greater proportion in future.

Program
The three day meeting will be organized in sessions comprising Key Note Lectures, Country Reports, Panel Discussion and Plenary Session. International and national experts on scientific, technical, policy and commercialization aspects will be invited to make presentations and/or participate in discussions. Representatives of civil society and farmer organizations will be requested to present stakeholders’ perceptions and issues. The proceedings of the Expert Consultation will be published jointly by APAARI and TARI for wide circulation among all concerned.

Funding
APAARI and COA will jointly meet the cost of organizing the Expert Consultation. COA has agreed to provide logistic support for organizing the meeting and also support travel and local expenses including lodging, boarding and transport of 10 NARS leaders from developing countries of the region, whereas other NARS members will be funded by APAARI. Other regional, international and private sector organizations will be encouraged to co-sponsor the organization of the proposed Expert Consultation.

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1 Biopesticides market to reach $1 billion in 2010. Available at: http://www.iem.com/article/biopesticides-market-to/8648