

## **Developing Malaysian seed industry: Prospects and challenges**

(Memajukan industri biji benih Malaysia: Prospek dan cabaran)

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Key words: seeds and planting materials, seed industry, private seed companies, balance of trade, seed production programme

### **Abstract**

Efforts to increase food production for both domestic consumption and export in recent years, have stimulated interest in the usage of good-quality seeds. Quality planting material is one of the main factors that determines the success of a commercial crop production. Currently, there is insufficient supply of good quality planting materials in Malaysia to cope with the increasing demand, resulting in farmers using imported seeds. Therefore, to ensure a reliable supply, the seed industry in the country must be developed. This paper outlines the current status of the seed industry, the prospects of seed production in various commodities and the constraints facing the industry. The strategies to strengthen the seed industry are also discussed.

### **Introduction**

The Malaysian government wants to modernize the agriculture sector with the objective of increasing food production. This is important for stabilizing the economy and reducing the yearly food import bill of RM13 billion. Consequently, agriculture has been identified as the third engine of economic growth in Malaysia, resulting in large scale farming projects being implemented throughout the country. In order to increase productivity, the various inputs (seeds and planting materials, labour, fertilizer, irrigation, crop protection and others) must be utilised effectively. Seed is considered as the primary and essential starting point of any agricultural projects. This concept holds good for any scale of production, whether it be in a small garden or on a large scale crop production. Lately, the Ministry of Agriculture and Agro-Based Industry (MOA) gave special focus on strengthening the local seed industry by formulating strategies to increase the supply of good-quality seeds and planting materials (which are still insufficient). It is envisaged

that the demand for seeds will increase with the implementation of many commercial agriculture projects by the government and the private sectors.

### **Seed industry status**

The seed industry comprises all the complex interlocking operations necessary to ensure a regular supply of uniform high-quality seeds to farmers. It is one of the group of industries, which make up the primary industry of agriculture. It relates to the general agriculture situation and to the socio-economic-political structure in a particular country. The seed industry has developed to varying levels in different countries, in tandem with the general agricultural development. The world's seed market is expanding, especially in the Asia and Pacific region.

The International Seed Federation estimated the total volume of annual seed consumption worldwide at approximately US\$50 billion with developing countries as the major consumers (Thammasak 2003). The estimated seed requirements for some countries

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in Asia are shown in *Table 1*. In the year 2000 and in terms of weight, rice seeds ranked highest for seeds consumed followed by wheat, maize, sunflower and vegetable seeds. Traditionally, the major seed-exporting countries are also importing certain types of seeds for local consumption. Currently, the major seed producing countries are the United States, Netherlands, France, Denmark, Germany, Canada, Italy, Japan, Australia, New Zealand, China, Thailand, Taiwan, Korea and India. Over the past decade, hybrid seed technology has gained great attention, due to its high yielding potential.

The seed industry in Malaysia is still developing even though it has been in existence for a long time. It is a unique industry due to the nature of agricultural development (based on commodities), where the progress differs between crops. In the plantation sector (which involves rubber, oil palm and cocoa), the seed

industry is already well developed and stable. Hence, the seeds for plantation crops will not be discussed in this paper. The major crops in the Malaysian agricultural sector are rice, fruits, vegetables, field crops, herbs, flowers/ornamentals and coconut. In general, the supply of high-quality seeds and planting materials for these crops is still insufficient and inconsistent. This is attributed to the lack of breeding programmes (in certain crops), lack of focus on seed production and lack of coordinations among the players in the seed industry. Currently, attempts are underway to transform and speed up the development of the agricultural sector as initiated by MOA. Therefore, it is necessary to revitalise and strengthen the nation's seed production programme since it is one of the enablers in the Balance of Trade (BOT) plan.

Table 1. Estimated seed requirements of selected crops, based on production area and specified seed rates (thousand tonnes) for the year 2000

Country	Rice (25 kg/ha)	Wheat (25 kg/ha)	Maize (12.5 kg/ha)	Sunflower (7.5 kg/ha)	Cucurbits (2 kg/ha)	Watermelons (0.75 kg/ha)	Tomatoes (200 g/ha)	Cabbages (200 g/ha)
Australia	3.9	301.8	1.1	1.25	–	0.01	0.02	0.0004
Bangladesh	327	21.25	0.03	–	0.05	–	0.003	0.002
Cambodia	49.5	–	0.9	–	–	–	–	–
China	714.7	666.2	293.4	6.5	0.45	1.0	0.16	0.23
Democratic People of Korea	14.3	2.6	6.2	–	0.02	0.3	0.002	0.008
India	1,112.50	668.7	81.5	16.9	0.7	0.01	0.1	0.05
Indonesia	294.8	–	41.3	–	0.05	–	0.01	0.02
Iran	–	137.5	2	–	0.10	0.1	0.02	–
Japan	42.5	4.6	–	–	0.03	–	0.003	0.001
Laos	12	–	–	–	–	–	–	–
Malaysia	18	–	–	–	–	0.004	–	0.0003
Myanmar	162.5	2.6	2.5	2.4	–	–	–	–
Nepal	39	16.3	10.3	–	–	–	–	–
New Zealand	–	1.13	11.6	–	–	–	–	0.0002
Pakistan	56.3	211.6	–	0.7	0.03	0.014	0.006	0.0008
Philippines	101.6	–	31.1	–	0.02	0.005	0.003	0.002
Rep. of Korea	3.9	–	0.2	–	0.02	0.004	0.001	0.011
Sri Lanka	21.3	–	0.4	–	0.02	–	0.001	0.001
Thailand	245	–	14.8	–	0.03	0.02	0.002	0.004
Vietnam	187.5	–	9.0	–	–	0.014	–	0.001
Others	50	5.2	2.5	0.8	0.05	0.011	0.004	0.004
Total	3,456.3	2,039.5	508.83	28.55	1.57	1.492	0.335	0.3357

Source: Thammasak 2003

**Seed requirement and supply situation**

**Rice** In relation to other crops, the rice seed industry is well developed and coordinated in Malaysia. It involves important departments and agencies such as MARDI, Department of Agriculture (DOA), MADA, KADA, LPP, FELCRA, KETARA and local seed companies. Rice breeding research has been given a high priority by MARDI. MARDI produces breeder and foundation seeds of recommended varieties and then supplies them to development agencies which later produce registered and certified seeds for distribution to the farmers. The major varieties currently under production are MR 84, MR 159, MR 167, MR 185, MR 211, MR 219, MR 220, MRQ 34, MRQ 50, MRQ 74, Pulut Siding and Pulut Hitam. The Department of Agriculture is the main producer of rice seeds in the country (about 32% of the total requirement). It has a number of processing plants strategically located in the double rice cropping areas. The other producers of registered and certified rice seeds are government agencies and local private companies. Significant amount of farm-saved seeds are also used by the farmers. Hence, the supply of rice seeds is planned and monitored by the government. The yearly country requirement for the rice seeds is estimated at 60,000 tonnes where 53,000 tonnes are produced by various agencies leaving a deficit of 7,000 tonnes (Izham et al. 2003).

**Fruits** Most fruits are propagated either vegetatively (clonal seedlings/plant parts) or by seeds. The well known commercial fruits in Malaysia are durian, rambutan, duku langsung (*Lansium* species), mangosteen, mango, guava, banana, jackfruit, citrus, pomelo, ciku, papaya, pineapple and watermelon. MARDI is responsible for fruit breeding programme. Some of the varieties/clones that have been developed by MARDI are durian (MDUR 78, 79, 88), ciku (MEGA), pomelo (Melomas), papaya (Eksotika and Eksotika 2), and pineapple (Josapine and Maspine). The Department of Agriculture (DOA) and local seed companies/nurseries are also producing

locally recommended clones. Despite all these efforts, the supply of seeds and planting materials is still insufficient to cater for the local demand. It is estimated that the country needs about 1 million fruit seedlings, 4 million pineapple suckers, 60 kg papaya seeds and 1.5 tonnes of watermelon seeds yearly.

**Vegetables** Vegetable is an important component in the diet of Malaysians. The area planted with vegetable crops was 40,000 hectares in 2001 (Anon. 2001). Due to the commercialisation of vegetables throughout the country, demand for seeds is also increasing. The yearly requirement of vegetable seeds is 265 tonnes but the local production is only 13 tonnes (Izham et al. 2003). This deficit of 252 tonnes/year is being imported from overseas. In the Asia and Pacific region, the major vegetable seed producing countries are China, Taiwan, Korea, Japan, Australia, Thailand, India and New Zealand. Seed importation is done through various seed companies namely Sin Seng Huat Seed S/B, Soon Huat Seed Corporation, Leckat Corporation S/B, Known-You Seed Company and others. With the introduction of hybrid seed technology, more and more hybrid vegetable seeds are being imported into Malaysia.

**Field crops, pasture and cover crops** The major types of field crops in Malaysia are corn, groundnut, sweet potato, cassava, yam and ginger. MARDI had released a number of field crop varieties for cultivation, including Manis Madu, Masmadu (sweet corn), MKT 1 (groundnut), Gendut, Telong, Jalomas (sweet potato), Sri Pontian, Sri Kanji 1, Sri Kanji 2 (cassava) and MKS 1 (green soybean). In sweet corn production, imported hybrid seeds are more popular amongst farmers due to its high yield and better market potential. The usage of sweet potato and cassava planting materials are small due to the lack of downstream activities while pasture and cover crop planting materials are imported from Australia, India and Philippines.

**Flowers and ornamentals** The major crops in floriculture industry are orchids, temperate flowers, pot plants and ornamentals. Planting materials are in the form of seeds, live plants, bulbs, tubers, rhizomes and cuttings. For orchid and temperate flowers, the industry depends heavily on the consistent supply of new hybrids/varieties from overseas (Thailand, Taiwan, Netherlands and China)

The yearly local seed requirement is shown in *Table 2*.

**Seed trade** Malaysia, like many other countries in Southeast Asia, is both an importer and an exporter of seeds. The seeds of vegetables, sweet corn, melons, pasture and cover crops are mostly imported while some of the orchids and ornamental plants are exported. In general, the BOT for the seed and planting material industry in Malaysia is in

deficit. The import value exceeds the export value by about RM18.22 million in 2000, RM17.88 million in 2001 and RM12.25 million in 2002 (Ahmad Tajuddin 2005) (*Table 3*).

**The way forward for the Malaysian seed industry**

Based on the yearly seed requirement and import-export situation, it is obvious that improvement strategies need to be undertaken to strengthen the local seed industry. The rapid growth of agricultural development is increasing the demands for high-quality seeds and planting materials. Malaysia also has to catch up with the other Southeast Asia countries with regards to agricultural development. Generally, two conditions are needed to set up a successful seed production programme. Firstly, seeds should be needed

Table 2. Estimated yearly requirements of seeds and planting materials in Peninsular Malaysia (2002)

Seeds/Planting materials	Requirement	Local supply	Deficit
Rice seeds (tonnes)	60,000	53,100	6,900
Vegetables (tonnes)	265	13	252
Fruit seedlings (millions)	2.5	1.5	1
Pineapple suckers (millions)	8	4	4
Papayas (kg)	160	100	60
Watermelons (tonnes)	1.5	–	1.5
Coconut seedlings (millions)	1.2	1.0	0.2
Flowers and landscape plants (RM million)	81.7	85.0	3.3 (export)

Source: Izham et al. (2003)

Table 3. Export-import of seeds and planting materials for the period 2000–2002 by major commodity groups

Seed Group	Export (RM mil.)				Import (RM mil.)				BOT (RM mil.)		
	2000	2001	2002	AGR (%)	2000	2001	2002	AGR (%)	2000	2001	2002
Vegetables	0.36	0.55	1.26	62.29	8.36	8.48	7.91	-2.79	-8.00	-7.93	-6.65
Fruits	0.94	1.24	2.87	56.09	2.55	2.45	1.89	-14.8	-1.61	-1.21	0.98
Ornamentals	1.29	2.37	3.30	46.80	5.81	6.69	5.72	-0.77	-4.51	-4.32	-2.42
Cover crops	0.12	0.00	0.02	-81.1	4.22	4.42	4.18	-0.38	-4.10	-4.42	-4.16
Total	2.71	4.16	7.45	50.62	20.94	22.04	19.60	-3.02	-18.22	-17.88	-12.25

Source: Ahmad Tajuddin (2005)

AGR = Average Growth Rate

BOT = Balance of Trade

for the local and export markets. Secondly, seeds of good quality should be produced in the country profitably. Under these two conditions, a viable seed industry can be established if specific programmes are undertaken in the following areas:

- Plant breeding – including genetic research and cultivars’ assessment
- Maintenance of stock seeds
- Multiplication/field-scale production
- Seed processing
- Quality control system – legislation, certification, testing and quarantine
- Marketing and distribution
- Extension activities

Historically, the government (through various departments/agencies) had organised four national seed symposiums in the years 1976, 1994, 2003 and 2005. The main objectives of the symposium were to discuss the progress of seed technology in the country, and to plan future development. However, the seed industry is still ‘dormant’ inspite of the many technical papers’ presentations and deliberated discussions. Nevertheless, these symposiums have triggered more awareness and ‘pressure’ to the policy makers, especially the Ministry of Agriculture and Agro-Based Industry, in upgrading the national seed industry. Considering the current status of the seed business in Malaysia, the objectives of developing the seed industry are:

- To provide sufficient and consistent supply of high-quality seeds and planting materials for recommended varieties/cultivars
- To reduce seed import bill (to support BOT programme)
- To upgrade the local seed industry via the advancement of seed technology in Asia and the Pacific region
- To invest in the seed industry as one of the business opportunities
- To maximise the utilisation of bio-diversity in tropical crops/species

Several critical facets need to be considered in developing the seed industry. They include the supply and demand, technical capability,

environmental, infrastructure and facility, leadership and experience, government policy and above all, the economic viability of the seed industry. The economic factor is a relative term which depends on the type of crops and their management. Subsequently, the cost of production can be reduced in the long term by proper crop management and utilisation of modern equipments. Malaysia is bestowed with an agro-climatic condition that is conducive for research and the development of seeds and planting materials for tropical crops. Today, the players (government departments/agencies and private institutions) are ready to carry out their more effective roles. These players include government departments/agencies (DOA, MARDI, LPP, FELCRA, FELDA, UPM, UKM, FRIM, KADA and MADA), private seed companies (Excel Seed S/B, Leckat Corporation S/B, Sin Seng Huat Seed S/B, Soon Huat Seed S/B, Synergy Farm, Hexagon Green S/B, Wellgrow Horticulture Centre and others) and other non-governmental institutions. In terms of infrastructures and facilities, DOA has established seed processing plants in strategic locations for rice, vegetables and field crops while MARDI has set up good facilities for seed processing at Serdang and at MARDI Jalan Kebun, Selangor. In the aspect of legislation, steps are being undertaken by the government to control and coordinate the seed industry by establishing the National Seed Act.

### **Prospects and opportunities**

The seed supply and demand analyses and the socio-economic viability factors indicated that seed and planting material production for the following commodities should be upgraded to meet the country’s needs.

#### ***Rice***

MARDI is presently entrusted with the task of rice breeding and improvement. It produces and distributes breeder and foundation seeds. From the foundation seeds, registered and certified seeds are produced by DOA, other local agencies including the private companies. The national production and distribution of

rice seeds are well coordinated by the National Rice Seed Assessment Committee (NRSAC) throughout the country. The switch from transplanting to direct seeding technology, has resulted in a tremendous increase in demand of rice seeds (60,000 tonnes/year). Farmers are also beginning to renew their seed stocks every season. The reasons are the assurance of good quality seeds sold at a relatively low price by the government agencies and the use of good prime seeds to combat grassy weeds. To ensure the usage of high-quality rice seeds, MOA is stepping up the production of certified seeds, thereby, sustaining the prospect of a bright and a viable rice seed industry. As the rice industry is given a high priority by the government, MARDI should continue its role in varietal improvement and the provision of foundation seeds to the implementation agencies. Lately, hybrid rice technology has received great attention in China, India, Vietnam, Philippines, Bangladesh, Indonesia, Myanmar and Sri Lanka. Malaysia has also started a breeding programme with a prominent Chinese scientist to produce hybrid rice varieties.

### **Fruits**

The fruit acreage in Malaysia has increased significantly from 156,000 ha in 1990 to 320,000 ha in 2000 (Anon. 2001). The country focuses on the development of '8 + 2' fruit types which include pineapple, papaya, mango, citrus, watermelon, guava, starfruit, durian, rambutan and jackfruit. Other fruits such as banana, mangosteen, ciku, duku (*Lansium species*) are also included. In terms of demand, per capita fruit consumption (Siti Hawa 2003) is expected to increase from 32 kg in 1995 to 50 kg in 2010, thereby resulting in a probable increasing demand for seeds and planting materials.

The basic problems currently are insufficient supply of existing varieties/clones and lack of new improved cultivars. There are only a few recommended varieties for each fruit type due to the tedious, time-consuming and complex exercise of breeding programme. With a yearly deficit of 1 million fruit

seedlings, 4 million pineapple suckers, 60 kg of papaya seeds and 1.5 tonnes of watermelon seeds (*Table 2*); a lot of production activities need to be carried out. Since the availability of new potential varieties is one of the key elements in the fruit industry, plant breeding and varietal improvement must thus be given a high priority. The potential of local fruit cultivars and indigenous species must also be fully exploited. In terms of watermelon seeds, Malaysia imports 1.5 tonnes of seeds/year worth RM2 million. In view of the increasing price of imported seeds, it is worthwhile starting our own watermelon hybrid seed breeding programme. However, importation of seeds have to be continued.

### **Vegetables**

Vegetable production in Peninsular Malaysia grew steadily from 11,604 ha in 1980 to about 40,000 ha in 2000 (Anon. 2001). As indicated in *Table 2*, the yearly requirement of vegetable seeds is 265 tonnes, mostly met by importation (252 tonnes). The local production is only 13 tonnes (5%) per year and mainly produced by DOA, MARDI and farmers' farm-saved seeds. This phenomenon (95% imported) has not changed very much since the existence of vegetable production in Malaysia. However, with the introduction of BOT programme, this issue needs special attention by the respective government agencies. Even though most of the imported seeds have high yielding potential and better consumers' acceptance, they have many disadvantages, including inconsistency in supply, very expensive prices and no guarantee in seed quality. Lately, DOA and MARDI have increased the production of local open-pollinated varieties (fruit vegetables) for distribution to the farmers. To keep in step with the development of the seed industry in neighbouring countries, research in hybrid vegetable seeds must also be carried out. The other opportunity is the promotion and utilisation of indigenous vegetables, which could create a new market. They are also easy to grow, more resistant to abiotic stresses and are more nutritious.

### ***Tropical flowers, ornamentals and foliage plants***

Presently, the floriculture industry in Malaysia has expanded to become a dynamic export industry in the agricultural sector. In 2003, the export value was RM101 million while import products was worth RM5.12 million. In the floriculture industry, the crops/products include temperate flowers, orchids, ornamental plants, foliages and dried flowers. Most of the planting materials (seeds, bulbs, tissue culture plants, cuttings and seedlings) are imported from overseas. In 2004, Malaysia imported 467 tonnes of flower seeds (including vegetable seeds), 1,245,000 flasks of tissue culture materials, 16,540,000 bulbs, 2,680,000 cuttings and 1,388,000 seedlings of various types of floriculture crops (Anon. 2004). With the production of new hybrids, the industry requires substantial investment in research and varietal improvement. Due to urbanisation and housing development, the pot plant trade and landscaping are also growing fast with an increasing demand. Malaysia is known for its 'bio-megadiversity', thus the possibility of utilising indigenous species/wildflowers is very bright. The other niche market is the development of tropical fragrant flowers which are abundantly available.

### ***Field crops, pasture and cover crops***

Amongst the field crops, sweet corn is considered a global crop. The major sweet corn producing countries in Asia are Thailand, China, Korea, India, Indonesia, Philippines and Taiwan, while Malaysia is one of the major consumers. In Malaysia, the demand for fresh consumption and processed sweet corn is increasing. Most of the local seed requirement is imported. At present, DOA and MARDI are producing some sweet corn varieties, namely Masmadu, Manis Madu and Thai Supersweet. However, these varieties are 'overshadowed' by imported hybrid varieties, suggesting that research in hybrid seed production technology must be given high priority, since corn can be easily grown in Malaysia. The other crops that have potential in the future are sweet potato, cassava and

yam. However, these 'local crops' need the support from downstream industries in order to create demand for their planting materials. For pasture and cover crops, local seed production is not viable due to the high cost of production and unsuitable weather conditions.

### **Challenges and constraints**

In commercial farming, high-quality seeds and planting materials must be available at the right time and in sufficient quantities (either supplied by the government or private seed companies). The present high seed import bill, is a real challenge for the MOA. Issues and constraints in developing Malaysian seed industry can therefore be classified as follows:

- **Technical and institutional problems**  
Currently, there is no single agency (one stop agency) responsible for farmers getting the recommended seeds and planting materials. In contrast, there are too many players or agencies existing in the seed industry but their functions are not well defined. For the private seed companies, their participation is only in seed trading rather than in seed multiplication; hence it will be difficult for the government to regulate them. The other problems are lack of breeding work, lack of trained personnel in seed technology and lack of modern seed processing plants and facilities.
- **Problems associated with seed supply and demand**  
In general, there is insufficient supply of recommended seeds and planting materials in the country. The seed multiplication programme is unable to meet with the increasing demand due to the commercialisation of the agriculture sector. The seeds of certain crops such as vegetables, watermelons and sweet corn are mostly imported from overseas. This can result in problems such as low seed quality and inconsistency in supply. Another problem is the difficulty in estimating the demand for seeds due to many factors particularly cropping

patterns, type of crops, location, planting seasons and fluctuating market.

- **Government policy and leadership**  
In Malaysia, each agricultural agency implements its own seed and planting material production programme to meet their requirements. With no single body to coordinate the national seed industry, there are duplications in their work, wasting of time and resources as well as unhealthy competition among the relevant agencies. The National Seed Policy is not yet implemented by the government. This policy is important for an effective seed production and distribution programme which covers various components in the seed supply chain such as the Plant Breeders' Rights, Plant Variety Protection, Seed Act, Gene Bank, Seed Quality Control and Legislation.
- **Agro-climatic suitability**  
Seed production ideally requires a dry spell for good seed maturation and also for the harvesting period. In Malaysia, although there is a dry spell, the general hot and moist climatic condition coupled with frequent heavy rain are not ideal for seed production. Some crops of temperate origin need a cold spell to flower or produce seeds after flowering. But this condition is not available in our tropical climate. Thus, the seed production of these crops (mostly vegetables) here is limited. If temperate vegetable seeds were to be produced here, additional cost is needed for the setting up of facilities for the controlled environments.
- **Socio-economic problems**  
The use of good quality seeds is not appreciated by the farmers. Some farmers prefer imported seeds compared with local seeds. In general, seed production is a high cost venture which cannot be carried out by the small farmers. Another problem is lack of promotion and marketing activities for the newly released varieties.

- **Lack of international linkages**  
There are many international organisations which coordinate the world's seed industry in the aspects of seed technology, seed trade and regulatory affairs. The potential benefits to the local seed industry are tremendous if the government agencies have a close collaboration or networking with the relevant organisations. However, there is still lack of strategic alliance and cooperation between local players in the seed industry and international organisations.

### **Development strategies**

The recommendations for strategies to meet these challenges and to strengthen the local seed industry are as follows:

- Promote the awareness of the importance of good-quality seeds in agricultural development.
- Implement a long term breeding programme for hybrid seed technology. Shortage of breeders in the agricultural sector should be overcome by the government.
- Upgrade and coordinate seed multiplication programme throughout the country by forming a National Seed Multiplication Committee. The functions of various departments/agencies as well as seed companies must be well defined. The lead agencies must focus on their roles only and not to be involved with other players which have little to contribute.
- Establish and upgrade seed processing plants and seed quality control laboratories. This includes proper storage facilities at the farmers' development centres. DOA's facilities and vast experience in seed production should be used as the model for a comprehensive national seed production programme.
- Develop an effective mechanism for technology transfer and extension.
- Establish and formulate National Seed Act, Seed Certification Scheme, National Seed Council and gene bank.
- Carry out regular seed market studies.

- Maximise the utilisation of local tropical crop species such as wild plants, wild flowers and indigenous vegetables in breeding and varietal development.
- Provide incentives and capital for seed producers.
- Establish strategic alliances with import-export companies and international seed institutions i.e. International Seed Testing Association (ISTA), International Seed Trade Federation (ISTF), AVRDC and Asean Pacific Seed Association (APSA).

### Conclusion

There is still a wide gap between demand and supply in the seed and planting material industry in Malaysia. The importation of seeds in large amount would be detrimental to the nation's economy. However, the seed industry sub-sector has a very bright potential for contributing to the transformation of agriculture. Nevertheless, it faces many challenges in the seed supply chain and the overall agricultural development. Special priority must also be given to plant breeding and capacity building in seed multiplication activities.

### Abstrak

Usaha-usaha bagi meningkatkan pengeluaran makanan untuk permintaan tempatan dan juga eksport sejak akhir-akhir ini telah menimbulkan minat untuk menggunakan biji benih berkualiti. Bahan tanaman berkualiti adalah salah satu daripada faktor-faktor yang menentukan kejayaan sesuatu projek pengeluaran tanaman secara komersial. Pada masa ini, bekalan bahan tanaman berkualiti di Malaysia tidak mencukupi untuk memenuhi permintaan yang semakin bertambah, menyebabkan petani-petani terpaksa bergantung kepada benih yang diimport. Bagi menentukan bekalan yang terjamin, industri biji benih negara hendaklah dimajukan. Kertas kerja ini menerangkan status semasa industri biji benih, prospek dalam pengeluaran biji benih untuk berbagai-bagai komoditi serta halangan-halangan yang dihadapi dalam memajukannya. Strategi-strategi bagi meningkatkan keupayaan industri biji benih juga dibincangkan.

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