

A Study on Morphological Features of Some Economic Plants Grown in Hinthada Township

Han Nwet¹, Khin Swe Hlaing² and Yee Yee Than³

Abstract

Many plants are being grown in Hinthada Township, Ayeyarwady Region. Among these plants, the total numbers of five species for commercial purposes namely, *Phaseolus mungo* L., *Asparagus officinalis* L., *Piper betle* L., *Oryza sativa* L. and *Nicotiana tabacum* L. belonging to 5 families such as Leguminosae, Liliaceae, Piperaceae, Poaceae (gramineae) and Solanaceae respectively, were studied in this project. The specimens were recorded with photographs and their morphological characters were briefly discussed.

Keywords: morphological features, economic plants, Hinthada Township, commercial purposes, five species

INTRODUCTION

Ayeyarwady Region is a region of Myanmar, occupying the delta region of the Ayeyarwady River. It is bordered by Bago Region to the north, Bago Region and Yangon Region to the east, and the Bay of Bengal to the south and west. It is contiguous with the Rakhine State in the northwest. The region lies between north latitude 15° 40' and 18° 30' approximately and between east longitude 94° 15' and 96° 15'. It has an area of 13,566 square miles (35,140 km²). The population is over 6.5 million, making it the most populous of Burma's states and regions. According to the National Census 2014 of Myanmar, there are 6175123 populations in Ayeyarwady Region (Website 1).

The Hinthada District lies at 17°38'0"N 95°30'0"E. It has an area of 2,697.28 square miles (6,985.9 km²). According to the National Census 2001 of Myanmar, there are 1,533,438 populations in Hinthada District. Hinthada District have four Townships: Hinthada Township, Zalun Township, Laymyethna Township, Ingapu Township (Website 2).

Hinthada is a city located on the Ayeyarwady River in Ayeyarwady Region, Burma (Myanmar) and the elevation is 17 m (56 ft.). In the 1983 census the city itself had a population of 82,005. By 2010 it had grown to 170,312. The trade of locally grown rice and grain goes through the part of Hinthada (Website 2).

In the present work, only morphological features of five species belonging to five families (Leguminosae, Liliaceae, Piperaceae, Poaceae (gramineae) and Solanaceae) are studied on the basis of economic values.

Economically the Leguminosae are one of the most important families of flowering plants. They provide many articles of food, folder, dyes, gums, resins and oils (Lawrence, 1964). Legumes are vastly grown in the world and their economic importance is distinguished worldwide. They are economical source of proteins for humans that add variety to the diet. The genus *Vigna* is encompassed of 20 species that are native to warm and tropical regions of the world (Kakati *et al.*, 2010).

Vigna mungo (Leguminosae) originated from central Asia and India from where it was domesticated. It is now found in many tropical areas of Asia, Africa and Madagascar. It is cultivated in the USA and Australia as a fodder crop (Jansen, 2006; Arora *et al.*, 1989).

¹ Lecturer, U, Department of Botany, Hinthada University

² Lecturer, Daw, Department of Botany, Hinthada University

³ Professor, Dr, Department of Botany, Hinthada University

Black gram is believed to be a native of India from where it spread to many tropical and sub-tropical countries. It may also grow fairly well on black or alluvial soils (Pandey and Chadha, 1999).

The main producer of black gram is India, which produces about 1.5 million tons of seeds annually. India consumes its entire production. The other main producers (Myanmar and Thailand) are the major exporters. Globally black gram accounts for more than 40% of total legume seeds traded (Website 5).

Economically the lily family stands high in the number of its genera important as ornamentals. Asparagus is an important vegetable crop (Lawrence, 1964). Siemonsma and Kasem Piluek (1994) stated that the origin of Asparagus is believed to be the eastern Mediterranean; however, it grows wild in Europe, the Caucasus and western Siberia. Originally, *Asparagus* was native to the sea coasts of Europe and eastern Asia (Jones et al., 2007). *Asparagus* is a native of Europe and Western Asia and has been in cultivation for over 2,000 years. It is grown in the cooler regions, moist climate and a well-drained soil of India (Pandey and Chadha, 1999).

The family Liliaceae widely distributed over the earth and particularly abundant in warm temperate and tropical regions. Most species are perennial herbs characterized by bulbs from which grow erect clusters of narrow, grass like leaves or leafy stems. A few are woody and some are small trees. The stems are green and function as leaves, while the leaves themselves are reduced to small scales. The tender shoots of asparagus are cut and eaten in the spring (Website 4). Asparagus plants are dioecious. The female plants are somewhat less productive and shorter-lived than males (Jones *et al.*, 2007).

Economically the family is important for the pepper of world spice markets (Lawrence, 1964). The betel plant is probably a native of Malaya. It is a shade loving plant and is best suited to grown in tropical conditions. It thrives in cool shade, high humidity and adequate supply of soil moisture (Pandey and Chadha, 1999).

The most important group of food plants is the cereals. Major cereal, rice cultivation had its origin in China about 2800 B.C. Over 85% of the world's rice is grown in China, India, Japan, Pakistan and their neighboring parts. China and India produce around 50% of world's rice supply (Pandey and Chadha, 1999).

Economically the grasses are probably of greater importance than any other family of plants. From a world viewpoint their importance can be indicated by the fodder for domestic animals and food for man (Lawrence, 1964). Rice (*Oryza sativa* L.) is the world's second most important cereal crop (Poehlman and Sleper 1995). The Asian cultivated rice is an economically important crop that is the staple food for more than one-half of the world's population (Bao-Rong 1999).

The Solanaceae is a family of considerable economic importance and is the source of fumitory plant as the Tobacco (Lawrence, 1964). Tobacco and betel leaf are mild stimulants. The first tobacco plant was introduced into Portugal in the year 1560, from where it spread to other countries. Its rapid exploitation in France was affected by Jean Nicot, after whom the plant was named Nicotina. Soon it rapidly spread over rest of Europe, Africa, Asia and even Australia. Till today, tobacco remains one of the most popular fumitories all over the world (Pandey and Chadha, 1999).

Many economic plants are grown in the study areas. Among these plants, five economic plants are studied in this project paper. These plants are important to produce the foods, medicines and mechanical products for local people as well as other foreign people.

The main aim is to study the morphological characters of some commercial plants. The objectives of this paper are to realize the economic values of studied plants and to understand the local needs of the cereals, pulses, vegetables, fumitories and masticatories.

MATERIALS AND METHODS

Study Site

The present study was carried out in Hinthada Township, Ayeyarwady Region. According to Geography Department, Hinthada Township is located on the western bank of the Ayeyarwady River. The town extends from North Latitude 17° 15' to 17° 39' and East longitude 95° 13' to 95° 30'. Its total area is approximately 22.79 sq-km (8.8 sq-miles) or 5632 acres.

Methodology

The present study was conducted from July 2014 to May 2017. The plants of 5 species (*Phaseolus mungo* L., *Asparagus officinalis* L., *Piper betle* L., *Oryza sativa* L. and *Nicotiana tabacum* L.) belonging to 5 families (Leguminosae, Liliaceae, Piperaceae, Poaceae (gramineae) and Solanaceae) were collected in Hinthada environs. Plant materials were photographically recorded about their habits, flowers and fruits. Their morphological characters were described in brief. The specimens were identified with the help of standard literatures such as Hooker (1875-1897), Baker and Brink (1934-1965), Dassanayake (1980-1999), John Kress (2003) and Hong Koug (2007-2009). They were alphabetically arrayed according to families.

RESULTS

Kanyut

Family name	- Liliaceae
Scientific name	- <i>Asparagus officinalis</i> L.
English name	- Asparagus
Common name	- Kanyut



Habit

Flowers

Fruits

Figure (1). *Asparagus officinalis* L (Kanyut).

Perennial herbs, erect, much branches, up to 6 feet tall, branches thin and drooping. Young stem fleshy when still under-ground; above ground stem strongly branched with fine,

needle-like foliage. Leaves reduced to scales on main stem, leaves of upper branches linear, about 2.5cm long and 0.5mm broad, in groups of 1-5 per node, glabrous. Inflorescence axillary, clustered flowers. Flowers small, perianth whitish-green, about 6.5mm long and 1.5mm broad; stamens 6, adnate at base of perianth segments, anthers orange; stigmas 3. Fruits berry, 6-8 mm in diameter, red when ripen, glabrous, with 3-6 seeds (Fig.1).

Flowering and fruiting period – August – October

Mat pe

Family name	- Leguminosae
Scientific name	- <i>Phaseolus mungo</i> L.
English name	- Black gram, Urd bean
Common name	- Mat pe



Habit

Flowers

Fruits

Seeds

Figure (2). *Phaseolus mungo* L. (Mat pe).

Herbaceous annual herbs with spreading, procumbent branches, reaching 30-100 cm in height. Stems or young twigs sparsely to densely brown hairy. Leaves alternate, trifoliolate pinnately compound, odd pinnate; petiole 6-20 cm long; leaflets opposite, stipules present at base of leaflets, leaflets ovate, tips acuminate, margins entire, bases deltoid or rounded, 4-10 cm long and 2-7 cm wide, covered with hairs, stipules conspicuous. Inflorescence axillary racemes, a group of 2-6 flowers at the top. Flowers small, zygomorphic; petal yellow, papilionaceous. Pods long, cylindrical, 4-7 cm long x 0.5 cm broad, hairy and has a short hooked beak; 4-10 ellipsoid oblong seeds, black or mottled seeds (Fig.2).

Flowering and fruiting period – April – July

Kun

Family name	- Piperaceae
Scientific name	- <i>Piper betle</i> L.
English name	- Betel
Common name	- Kun



Habit



Inflorescence

Figure (3). *Piper betle* L (Kun).

Perennial climbers, climbing by many short adventitious rootlets, dioecious. Stems rooted at nodes, slightly woody. Petiole 2-5 cm, stout, very finely powdery pubescent; leaves heart-shaped, leaf blade broadly ovate to ovate-oblong, 7-15 × 5-11 cm, leathery, bases cordate, sometimes rounded in leaf blades toward apex of stem, symmetric or nearly so, margins entire, apices acuminate; veins 7, reticulate veins conspicuous, glabrous, thick, shining. Spikes dense, cylindrical, leaf-opposed. Male spikes nearly as long as leaf blades at anthesis; peduncle nearly as long as petioles; rachis pubescent; stamens 2, filaments thick, as long as anthers or longer, anthers reniform. Female spikes 3-5 cm long, pendulous, longer in fruit, rachis fleshy, densely pubescent; ovary partly immersed in and connate to rachis, apex tomentose, stigmas usually 4 or 5, lanceolate, tomentose. Drupes fused to form terete, fleshy, reddish, compound fruit, apices tomentose, prominent (Fig.3).

Flowering and fruiting period – May – July

Saba

Family name	- Poaceae (gramineae)
Scientific name	- <i>Oryza sativa</i> L.
English name	- Rice
Common name	- Saba



Field of paddy



Flowers at anthesis



Grains

Figure (4). *Oryza sativa* L. (Saba).

Annual herbs, 50-130 cm tall. Stems (culms) round, hollow, with node and internode, branches or tillers, covered by leaf sheath. Leaves thin, blade linear, 24-60 cm x 0.6-2.2 cm, with spiny hairs on margin. Inflorescence terminal panicle, drooping, 9-40 cm long, with 50-500 spikelets, spikelets borne on short pedicle, oblong to lanceolate. Flower bisexual, 6 stamens, 2 plumose stigmas. The fruits caryopsis, varying in size, shape and colour, ovoid, ellipsoid or cylindrical, 5-7.5 mm x 2-3.5 mm, whitish-yellow or brown to fuscous (Fig.4).

Flowering and fruiting period – September – November

Say-Ywet-Gyi

Family name	- Solanaceae
Scientific name	- <i>Nicotiana tabacum</i>
L.English name	- Tobacco
Common name	- Say-Ywet-Gyi



Habit

Flowers

Fruits

Figure (5). *Nicotiana tabacum* (Say-Ywet-Gyi).

Herbs, robust annual, about 3 - 6 feet in height. Stem unbranched and bears large leaves; all parts sticky, covered with short viscid-glandular hairs. Leaves varied in size, numerous, alternate, simple, sessile, lamina ovate-lanceolate or elliptic, shortly acuminate at the apex, margin entire, decurrent at the base, lower leaves largest, up to 60 cm long, shortly stalked or sessile, the following leaves decrease in size, the upper one sessile and smallest, slightly viscid and hairy, exstipulate. The inflorescence terminal, many trumpet-shaped flowers; calyx with five narrowly triangular lobes, 1.5–2 cm long; corolla tube 5–6 cm long, 5 mm in diameter, lobes broadly triangular, white-pinkish with pale violet or carmine colored tips, tube yellowish white. Capsule ovoid or ellipsoid, with a short apical beak, surrounded by the persistent calyx, about 2 cm long. Seeds numerous, very small, ovoid or kidney shaped, brown (Fig.5).

Flowering and fruiting period – Jun – October

DISCUSSION AND CONCLUSION

Ayeyarwady Region is heavily forested and wood products are an important component of the economy. The principal crop of Ayeyarwady Region is rice and the

division is called the “granary of Burma”. In addition to rice, other crops include maize, sesame, groundnut, sunflower, beans, pulses and jute (Website 1).

Plants form a fundamental part of life. The main sources of food are all derived from plants. Many plants grow in this study area. Among these plants, some economic plants such as cereals, pulses, vegetables, fumitories and masticatories were especially studied in this project.

Fernandez-Orozco et al. (2008) stated that bean sprouts can be cooked in many ways or eaten raw. They are rich in vitamins, minerals, and have been reported to contain important phytochemicals for disease prevention and health promoting benefits. Black gram complements the essential amino acids provided in most cereals and plays an important role in the diets of the people. Green gram (*Vigna radiata*) and black gram (*Vigna mungo*) are two of the most imperative food legumes grown and consumed (Kakati *et al.*, 2010).

Pandey and Chadha (1999) stated that the plant is well adapted to grow on heavy, loamy soils having water retention properties. In this work, it was found out black grams (pulses) are widely cultivated in loamy soils of Hinthada Township for local people needs and export quality. Black grams are highly valued plants for human and animal food as cereals, pulses and vegetables. It is nutritious and is recommended for diabetic diseases, as are other pulses. Black grams are made as bean sprouts for local people consumption. According to a local saying, black grams are exported to foreign Regions for preparedness in mechanical oil.

The betel leaves are aromatic with varied taste, ranging from sweet to pungent due to the presence of essential oils. With a lot of light, but adequate soil moisture: the leaf becomes darker green, harder, rough taste. With less light, but adequate soil moisture: leaf becomes light green, thinner its, taste becomes lighter, smaller leaf sizes. With adequate light, but less soil moisture: hard leaf, smaller size, rough taste, early falling leafs, turn leafs yellow, weak plant stem, less number of leafs per plant, broken-uneven edges. With adequate light, but too soil moisture: rotten roots, dying plants, slowdown in leaf maturity, weaker taste (Pradhan *et al.*, 2013).

Researchers from India called the betel as golden green because, the valuable nutrients are found in the betel leaves. Nowadays, the betel plants are cultivated throughout Myanmar. There are two kinds of betel leaves, namely yellow betel and green betel. Yellow betel is mostly exposed from Mandalay Region. Green betel is particularly exported from Hinthada Township, Ayeyarwady region. Hinthada's Betel is more famous than other townships.

Betel leaves are useful for many purposes. Many people like the betel leaves for mastication. The leaves are commonly chewed with lime and areca nut. Sometimes coconut shavings, clove, cardamom, fennel and tobacco leaves are added in quid of betel. Nevertheless, if eaten too much, it causes bad health. However, betel leaves have medicinal value and are used in many ways.

Betel is typically propagated from stem cuttings rather than from seeds for commerce. Pandey and Chadha (1999) stated that the soil most suited for betel cultivation is friable clayey loam, rich in humus and with appropriate drainage. In Hinthada Township, it is widely cultivated in clayey loam and with appropriate drainage soil condition. In this project, the flowers of Betel plant were not found during research period because the betel plant is cultivated for leaves.

Asparagus is a valuable crop and one of the earliest of the spring vegetables. Asparagus is a perennial crop and a planting may remain productive for 15 years or more.

Spear size and yield will decrease after 12 to 15 years (Website 3). According to the National Cancer Institute, asparagus is very high in glutathione, one of the body's best cancer fighters. Asparagus also contains rutin, which strengthens blood vessels (Jones et al., 2007).

Asparagus officinalis is a vegetable that is widely consumed worldwide and has also long been used as a herbal medicine due to its anticancer effects (Huang and Kong, 2006). Although the roots and shoots of *A. officinalis* are consumed as popular vegetables and homeopathic supplements, its other parts, such as its leaves, are generally not used (John Wiley & Sons, Inc., 1999-2016).

Asparagus can be grown in many soil type, but deep loam or sandy soils with good surface water and air drainage are best. Therefore, good soil drainage is essential (Website 3). Asparagus grows in a wide variety of soils but grows best in a light well-drained soil with a high nutrient content (Gosper, 2004). *Asparagus* grows best in cool and moist climate and a well-drained soil (Pandey and Chadha, 1999).

The young tender shoots (spears) of Asparagus (Kanyut) are edible parts. Kanyut is widely consumed by local people and exported to other Regions for vegetables. Hinthada's Kanyut is more well-known than that from other townships. Therefore, Kanyut is widely cultivated in sandy loam with good drained soil in many villages in Hinthada Township.

Rice is the staple food of 40% of the world population and the main food throughout South-East Asia (Grubben and Partohardjono, 1996). Kyaw Myint (2004) reported that the rice is the daily staple food for Myanmar people. With the annual population increase of 2 % in Myanmar, as the annual precipitate rice consumption of Myanmar is 190 Kilogram. It is the highest compared to other rice eating nations. Hence, to cope with the problem of not only for self-sufficiency for domestic consumption but also for export to foreign counties there have been successive attempts at increasing cultivation and production of rice by various means. Rice grows best in regions having clayey loams with high nitrate content (Pandey and Chadha, 1999).

Nowadays, very important cereals (various rice varieties) are cultivated in Hinthada Township not only for local people but also to export to other foreign Townships and Regions (Fig.6). Reliable rice varieties are cultivated on suitable soil types in different Townships for local needs. In Department of Agriculture (DOA), Seed Division, Tagondaing Seed Farm, Hinthada, Ayeyarwady Region, various rice varieties and different bean cultivars are tested for quality and yield.

All parts of Tobacco plant contain nicotine, which can be extracted and used as an insecticide. The dried leaves can also be used; they remain effective for 6 months after drying. The juice of the leaves can be rubbed on the body as an insect repellent. The leaves can be dried and chewed as an intoxicant. The dried leaves are also used as snuff or are smoked. This is the main species that is used to make cigarettes, cigars, and other smokable tobacco preparations (Grieve, 1995-2014).

Tobacco is one of the vegetables (fumitories and masticatories) cultivating the local trade specifically on a leaf basis. Pandey and Chadha (1999) stated that the soil best suited for growth is a light, sandy loam, rich in humus. In Hinthada Township, Tobacco is particularly cultivated in sandy loam soil. Its leaves are commercially grown in many countries to be processed into tobacco. Tobacco is not the highly cultivated plant for food while it is used for medicinal purposes. It is consumed by smoking, inhaling or chewing. Therefore, it is essential for financial and economic policies.

Human beings on the earth need food, clothing and shelter for survival. Therefore, food plants, useful plants and economic plants must be cultivated to meet humans'

necessities. In this work, food (cereals, pulses, vegetables, fumitories and masticatories) was chiefly studied.

Thus, this paper was presented to known precisely about some economic plants for future investigation and to evaluate the resources of raw economic materials for man's needs. The rest of the economic plants in Hinthada Township should be studied in future.



Betel (Kun)



Asparagus (Kanyut)



Tobacco (Say-Ywet-Gyi)



Black gram (Mat pe)



Rice (Saba)



Figure (6). Products prepared for export.

Acknowledgements

We express our gratitude to Dr Tin Htwe, Rector, and Dr Thein Gi Shwe, Pro-Rector, Hinthada University, for their encouragement to carry out this research. Our thanks also go to Dr Moe Moe Khing, Professor and Head of Botany Department, Hinthada University, for her permission and valuable help in the work. In addition, we would like to express profound thanks to Dr Toe Su Hlaing, Professor and Head of English Department, Hinthada University, for her help in the English language used in this paper.

References

- Arora, R. K. and Mauria, S. S., (1989). *Vigna mungo* (L.) Hepper. Record from Proseabase. van der Maesen, L. J. G.; Somaatmadja, S. (Eds). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia
- Baker, C. A. and Bakhuizen Van Den Brink, R. C., (1946-1965). Flora of Java. N.V.P. Noordhoff. Groningen. The Netherlands.
- Bao-Rong, L., (1999). Taxonomy of the genus **Oryza (Poaceae)**: historical perspective and current status. International Rice Research Institute. p-4.
- Chinese Academy of Sciences, (2007-2009). Flora of Hong Koug. Houg Koug Herbarium. Agriculture, Fisheries and Conservation Department & South China Botanical Garden.
- Dassanayake, M.D., (1997-2000). Flora of Ceylon. University of Peradeniya, Department of Agriculture, Peradeniya, Sri Lanka, and the Smithsonian Institution, Washington, D.C,U.S.A.
- Fernandez-Orozco, R., Frias, J., Zielinski, H., Piskula, M.K., Kozłowska, H. and Vidal-Valverde, C., (2008). Kinetic study of the antioxidant compounds and antioxidant capacity during germination of *Vigna radiate* cv. *Emerald*, *Glycine max* cv. *Jutro* and *Glycine max* cv. *Merit*. *Food Chemistry*, 111, 622-630.
- Fery, F. L., (2002). New opportunities in Vigna. In: J. Janick and A. Whipkey (eds.), Trends in new crops and new uses. ASHS Press, Alexandria, VA: 424-428
- Gosper, H., (2004). Organic Asparagus Production. Robyn Neeson, Organic Farming Liaison Officer, Yanco.
- Grieve, M., (1995-2014). A Modern Herbal. Botanical.com Home Page.
- Grubben, G. J. H. and Partohardjino, S., (1996). Plant Resources of South East Asia. (Cereals) Bogor, Indonesia.
- Huang, X. and Kong, L., (2006). Steroidal saponins from roots of *Asparagus officinalis*. *Steroids* 71:171–6.
- Hooker, J. D., (1875-1897). Flora of British India. L. Reeve & CO.LTD. The Oast House, Brook, NR, Ashford, Kent England.
- Jansen, P. C. M., (2006). *Vigna mungo* (L.) Hepper. Record from Protabase. Brink, M. & Belay, G. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l’Afrique tropicale), Wageningen, Netherlands.
- John Kress W., Robert, A., Defilipps Ellen Farr and Yin Yin Kyi, Daw., (2003). A Checklist of the Trees, Shrubs, Herbs and Climbers of Myanmar. Department of systematic Biology. Botany, national Museum of Natural History Washington, DC.
- Jones, T., Woods, T. and Strong, J., (2007). Commercial Asparagus Production. Agriculture & Natural Resources. Family & Consumer Sciences 4-H Youth Development. Community & Economic Development.
- Kakati, P., Deka, S. C., Kotoki, D. and Saikia, S., (2010). Effect of traditional methods of processing on the nutrient contents and some antinutritional factors in newly developed cultivars of green gram [*Vigna radiata* (L.) Wilezek] and black gram [*Vigna mungo*]
- Kyaw Myint, (2004). Rice varieties in Myanmar. In Commemoration of the International Year of Rice. p 37-56.
- Lawrence, George H. M., (1964). Taxonomy of Vascular Plants. The Macmillan Company: New York.
- Pandey, S. N. and A. Chadha, (1999). Economic Botany. Vikas Publishing House Pvt. Ltd. 576, Masjid Road, Jangpura, New Delhi.

- Pradhan, D., Suri, K. A., Pradhan, D. K and Biswasroy, P., (2013). Golden Heart of the Nature: Piper betel L. Journal of Pharmacognosy and Phytochemistry. India.
- Parashar, S. M. P., (2006). Post-harvest profile of black gram. MRPC-71, Ministry of agriculture, Directorate of marketing and inspection, India.
- Poehlman, J. M. and D. A. Sleper., (1995). Breeding field crops. Fourth Edition. Iowa State University Press/ Ames. pp-295-297.
- Tang, X. H. and Gao, J., (2001). Inhibitory effects of juice from *Asparagus officinalis* L. on cyclophosphamide (CTX)-induced mutagenic activities in mice. J Nanjing Univ (Nat Sci) 37:569–73.

Online References

1. <http://en.wikipedia.org/wiki/Hinthada-Township>
2. <http://en.wikipedia.org/wiki/Ayeyarwady-Region>
3. <http://osufacts.okstate.edu>
4. <http://www.mdidea.com> and www.mdidea.net
5. [http:// www.feedipedia.org/node/7272](http://www.feedipedia.org/node/7272)