

IP Protection and Commercialization of Innovative Seeds in Vietnam: Situation and Challenges

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ABSTRACT

Vietnam has gained many achievements in the research and development of new varieties of green revolution. New plant varieties are what brought success to Vietnam's agriculture over the decades, especially rice varieties. Although the legal documents on the protection of intellectual property rights on seeds have been built, percentage of protected varieties is little because of many reasons. Vietnam has studied and created many varieties but only few varieties were capable of cultivation in large area due to competition by imported varieties. Varieties protection is the pressing and necessary issue and needs to be improved. Currently, the protected varieties show that popularizing, expanding and commercializing capability are better. The government should improve the institutional framework of the law in intellectual property right protection for new plant varieties to promote the commercialization of varieties and agricultural products in the conditions of international economic integration.

Keywords: IP protection, seed, commercialization

INTRODUCTION

Seeds are considered as the most important factor in Vietnam's agricultural production in order to make products with high yield, high quality, and adapt to the country's various climate conditions. As a large exporter of agricultural products in the world, Vietnam needs to exercise self-control on the types of plant seeds. Therefore, besides the mechanism and policy innovation, and attracting agencies to be involved in seed production, planning problems for the seed industry should also be considered. According to experts of the Ministry of Agriculture and Rural Development, at present, Vietnam has actively almost produced types of seeds of main crops (i.e. food crops).

For rice, the local centres and institutes have bred 260 inbred rice varieties and 70 hybrid rice varieties. So far, Vietnam has absolutely taken the initiative in self-supply of rice varieties. Most rice products, which are exported by the Mekong Delta, are produced from Vietnam. Out of

seven major hybrid rice varieties being exported at present, only Jasmine variety is imported from abroad.

In the Northern and Central provinces of Vietnam, many hybrid rice varieties have been bred successfully, reducing the dependence on imports from China. Annually, there are from 650,000 to 700,000 hectares of hybrid rice cultivation, accounting for about 10% of the total area of rice production. In 2013, in order to ensure the production demands for production seasons, Vietnam imported approximately 800,000 tons of rice seeds of all kinds, in which there were about 11,000 tons of hybrid rice seeds. From entire import of hybrid rice seeds from abroad, Vietnam is gradually researching, selecting and completing the production process of many domestic first-generation (F1) of hybrid rice seeds. At present, the volume of domestic F1 seeds meets approximately 35% of the demand depending on each production season. Vietnam has established the focal areas for the crafts villages and cooperatives specializing in F1 hybrid rice seed production in districts such as Xuan Truong, Hai Hau of Nam Dinh Province. Until now, the production of F1 hybrid rice seeds in Nam Dinh is stable and developing with production technologies and its growing scale. Every year, Nam Dinh Province has about 600 hectares of F1 hybrid rice seed production with appreciated seed quality.

As a unit with tradition in rice-seed research and selection, the Field Crops Research Institute (FCRI) has been breeding dozens of high-quality domesticated rice and hybrid rice varieties to gradually replace Chinese rice varieties in the Northern and Central provinces.

Besides the export of peanut varieties, soybeans and mungbeans, root crops such as potatoes, sweet potatoes, cassava, and arrowroot are also the strength of the Institute and have been planted popularly in the North and Central parts of Vietnam. Currently, the Institute is investing in research and production of summer vegetables such as courgettes, cucumbers, and tomatoes. To accelerate the process of transferring seeds to farmers, the Institute has established a scientific enterprise and sold copyrights of the rice seeds to many seed companies in each geographical region in order to popularize more the Vietnam plant seeds. Although there have been tremendous developments in the selection, breeding and research of plant varieties, however, in 2013, Vietnam still had to spend hundreds millions of dollars to import many varieties for domestic production.

Although Vietnam has self-produced rice varieties, conventional vegetables and summer vegetables, it has to import 80% to 95% of premium vegetables and flowers (kohlrabi, cabbage, chilli, broccoli and all kinds of orchids) which needs huge investments and high technologies.

Besides, in recent years, the large amount of money spent on investments in seed selection research was invested with imbalance. Vietnam focused too much on food crop seeds to ensure food security, while the high-value and valuable crops have recently been focused too. Due to new market opportunities for vegetables and flowers, the import of their seeds is inevitable. However, many research institutes and centers are investing in selecting and breeding a number of high-end plant seeds. Typically, the Southern Seed Corporation has launched the planting of seeds of red pumpkin, wax and chilli which are produced in Vietnam and can absolutely compete with imported seeds in the near future. However, according to many agricultural experts, the current problems are not only research, selection and breeding of seeds for the domestic production but also in terms of bringing quality seeds to the farmers.

In spite of huge investments and research, there are lots of high-quality rice seeds that fully meet the domestic demand, but the farmers still have difficulties in accessing to the quality seeds due to a limited breeding system and seed production technology. In order to ensure the quality of seeds, a huge investment and consistency in seed production should be in place. There should be policies to attract businesses especially to foreign enterprises, to invest in seed production in Vietnam. Both seed production systems including companies, state research institutes and community should be promoted simultaneously.

Accordingly, the State's role in creating an institutional environment will be a critical factor. The state should make policies to encourage scientists, farmers and enterprises to join hands together in seed production. The enterprises will be the motivation and the key to solve problems of funds, facilities, large volumes of seeds from which the seed industry will be formed. Thus, the species and quality of seeds will gradually be improved. However, the state should have a strategic planning for the seed industry, a seed planning for each sector, and the seed production system. Aside from mobilizing the participation of actors in seed production and business, the problems of completing institutional environment in the protection of intellectual property (IP) for seeds will play a key role.

POLICY AND INSTITUTIONAL ENVIRONMENT FOR VIETNAM SEEDS

In order to improve the system of research, selection and breeding, transfer, production and supply of plant seeds, livestock breeds, forest plant seeds, aquatic strains in the direction of industrialization and modernization to sustainably increase the productivity, quality, competitiveness and efficiency of agricultural, forestry and fishery production, and the farmers' incomes, the State approved the Scheme on Development of Agricultural and Forest Plant Varieties, Livestock Breeds and Aquatic Strains up to 2020 under the Decision No. 2194/QĐ-TTg (2009). Some solutions proposed are as follows:

Planning and completing the seed research, production and supply system from central to local associated with the agricultural - forestry - fishery production areas. Namely, there are planning and investments to improve the capacity of seed centers, enterprises, cooperatives and households associated with regional scientific and technology institutions to synchronously implement research, breeding selection and multiplication of certified seeds for mass production in the region.

The State's Budget supports the construction of infrastructures to concentrated seed production areas applying high technologies in seed development, with a maximum amount of 50%; supports a maximum amount of 50% of production costs of master (breeder) seeds, first-line seeds, super-elite seeds, great grand-parent livestock breeding, grand-parent livestock breeding and parent livestock breeding for hybrid varieties and a maximum amount of 30% of production costs of hybrid varieties for some varieties that should be encouraged.

Organizations and individuals investing in the production of master seeds, super elite seeds, elite seeds, parent lines (for hybrid varieties), first-line seeds, great grandparent livestock breeding, grandparent livestock breeding, nucleus farms, breeding farms, forest plant nurseries, breeding forests, new varieties using high technology with credit loans from development investment funds of the State in accordance with current regulations. The National Scientific and

Technology Development Fund and the Local Scientific and Technology Development Fund finance the pilot projects on seed production and processing. The priority is to apply advanced seed technology for the economic sector.

Vietnam's system of legal documents on plant seeds include the Seed Ordinance (2004), Intellectual Property Law (2005) and Amendment of Intellectual Property Law (2009).

The Law on Vietnam's plant seeds complies with the International Convention for the Protection of New Varieties of Plants (UPOV). Vietnam officially has become a member of UPOV in December 2006. The Seed Ordinance regulates the management and conservation of plant genetic resources, the selection, testing, inspection, audit, recognition, accreditation of mother plants, initial plants, nurseries, plant breeding forests; and seed quality management. Approaching Vietnam's plant variety management under the List of plant varieties permitted for production and business in Vietnam is issued by the Ministry of Agriculture and Rural Development. Meanwhile, the field of farmer's plant varieties has not been prescribed by the management.

The Intellectual Property Law adopted by the National Assembly of Vietnam in November 29, 2005 and amended in 2009, contains provisions on intellectual property rights of plant varieties, in which Organizations and individuals have rights in the selection or discovery and development of the plant varieties. The Ministry of Agriculture and Rural Development has issued the Guidelines on rights of organizations and individuals for new plant varieties which are selected or discovered and developed to serve agricultural production, and establishment of new plant variety protection offices where the organizations and individuals can register the protection of their intellectual products.

CURRENT STATE OF RESEARCH AND USE OF RICE VARIETIES IN VIETNAM

Rice is the sector that the State prioritizes investments in Vietnam. According to the reports of the Department of Crop Production in 2015, the total cultivated area of Vietnam is 7.66 million hectares. There are 379 rice varieties in the category (including 270 inbred rice varieties, 88 hybrid rice varieties and 21 glutinous rice varieties). In the category, there are 122 varieties which are no longer produced; and nearly 100 varieties which are planted in small areas, scattered and have their own peculiarity. There are only 66 major rice varieties, including 66 inbred rice varieties, five glutinous rice varieties and 15 hybrid rice varieties, accounting for 91% of the total area. Twelve major rice varieties are accounted for 47% of the total cultivated area in the whole country, in which 8 inbred rice varieties of Vietnam are the IR50404, OM5451, OM4900, OM6976, OM4218, OM5954, BC15 and TH 3-3 varieties (hybrid rice). Five in thirteen non-glutinous rice varieties with their large area are created by breeding and selected by the Vietnam Academy of Agricultural Sciences (VAAS) system. Other varieties originated from China or other countries, but they will be re-selected by the businesses or the Academy of Agricultural Sciences.

There are 17 major selection and breeding units in Vietnam, including six enterprises, 11 Institutes and universities. There are 263 seed production and trading enterprises in the regions, in which five large enterprises hold more than 30% of the rice seed market share in the whole country. Although the State's investments in agricultural science and technology research is low,

accounting for only 0.2% of GDP, but the State prioritizes the seed sector. Many researches, projects and programs on seed selection and breeding were carried-out such as key development programs and biotechnology applications in the field of agriculture and rural development in the 2006-2010 period, in which 90 science and technology tasks were approved to be put into practice (including 78 researches and 12 pilot production projects), 35 researches completed in 2010 and the program of science-technology and environmental activities in the 2006-2010 period showed that: There are 170 new rice varieties, in which a lot of varieties were developed in a large scale production. The result is that the innovative rice varieties are applied in over 80% of the cultivated area.

As far as research is concerned, Vietnam has mastered the seed selection and breeding technologies such as breeding, mutation, cell, molecular marker, and recently genetic technology. While there are many rice varieties to be bred (about 255 varieties), the existing varieties in production are very few. A large number of varieties cannot exist in production. Most varieties originated from abroad and domesticated into Vietnam varieties should be restricted to export with their brands. Every year, many new varieties are launched but there is no rice branded specialty rice varieties for export and the proportion of high-quality rice varieties exported is still low. These restrictions will be solved with policies on the protection of seed intellectual property.

CURRENT STATE AND ISSUES ON THE PROTECTION OF SEED INTELLECTUAL PROPERTY AND COMMERCIALIZATION

In 2005, Vietnam has 575 new plant varieties (Department of Crop Production, 2006) used in production in all regions of Vietnam, but there are only about 30 varieties protected for copyright. So far, there are eight rice varieties sold for 13 billion VND. In which, the prominent varieties are: inbred rice variety BC15: 300 million VND; Khang Dan mutant rice variety: 350 million VND; Mutant rice variety No. 6: 450 million VND; Mutant rice variety No. 5: 500 million VND; Viet Lai 20 hybrid rice variety: 300 million VND; HYT 103: 500 million VND; TH 3-4: 700 million VND; TH3-3: 10 billion VND). However, not all varieties are sold.

The issue of plant copyright has been applied in many developed countries. Accordingly, when creating a new variety, the research units will sell this variety development copyright to a company for development. The company will have full rights to develop this variety in its direction. The unique unit is authorized to organize the production and sale of seeds and seedlings.

The issue of plant variety copyright protection is new and less developed in Vietnam. The researchers, who are invested by the State, have a duty to create new plant varieties which are more and more progressive by breeding. For example, new rice varieties must have a number of criteria such as higher yield in comparison with varieties being used in the region by at least 10% and at stable state through production seasons. There should be better quality (high nutrition, delicious), better pest resistance, shorter growing time and well-adapted to the production conditions. The State allows the varieties, which are created by using investment from the State budget, to be able to register their copyrights under the Intellectual Property Law. The copyright registration is relatively convenient. Registration agency deploys checking the distinctness,

uniformity and stability in two production seasons in order to have accurate results and a base for granting a certificate. A breeder with a protection certificate will have the right to transfer.

Intellectual property should follow the market rule, “negotiated price” if transferred. The breeder is a person who knows best the value of this new variety. When finding a buyer who fully understands the value of that variety, the intellectual property will be sold at the most affordable price. Of course, the buyer has to produce, display and participate in market expansion and anticipate farmers' purchasing power for the seeds. If the breeder only creates new varieties but does not produce seeds to sell, not broadly display, not fully assess the variety's advantages and disadvantages or has no trading market, the variety should be sold at cheap price so that the buyer, who purchased its copyright, will organize the production and expand markets. After the transfer of copyright, the breeder has time to focus on new researches, and has abundant fund to improve the quality of further researches.

Law on plant variety copyright clearly defined that no individual or organization will allow to grow or trade that variety without an agreement with the company who bought its copyright. Thus, the copyright purchase of a company as in the developed countries is a great motivation for research institutions to continue creating better varieties. The transfer of variety copyright to organizations and businesses will facilitate new varieties to be survived longer, with production area expanded faster. Protection of plant varieties will also aim to ensure that farmers produce the best plant varieties; to facilitate reinvestment in seed selection and breeding researches, and are derived from agricultural production requirements. The Institutes and Centres will have a budget to reinvest in researches and scientists will also have higher incomes from their variety copyrights. Therefore, it motivates people to invest in creating a lot of new varieties with high quality and bringing great effects to the society.

Vietnam's Policy, Article 32, Decree No. 104 defines that the transfer of plant varieties, which are created from the budget, must comply with the regulations on State's asset management. According to the guidance of Hanoi Tax Department, the breeders must pay 10% of total amount from copyright selling to the State. Based on the Article 29 of Decree No. 104, some units allow the breeders (or breeder groups) to be entitled to a maximum of 30% of the contract value after paying taxes to the State. Meanwhile, some units applying the Law on Technology Transfer allow the breeders to be entitled to 20-30% of receipts from the copyright transfer agreements, 50% of the rest amount should be paid in the science and technology development fund, and other 50% should be paid in bonus and welfare funds of the unit. At present, not many private units spend their own money to research and register the variety protection. While transferring copyright, the breeders will negotiate the price with enterprises. Of course, they have to pay their personal income tax.

Currently, there are 37 protected crop varieties in Vietnam. Organizations and individuals must make three sets of registration dossiers (in form) at the Office of Plant Variety Protection under the Department of Crop Production. Eligible dossiers will be published in the *Journal of Agriculture and Rural Development*. Then authority will conduct a DUS testing and an evaluation of new characteristics and name of the variety. Normally, the evaluation for cash crops should be conducted over two production seasons with same name at minimum (i.e. two winters or two production seasons - PV). Evaluation agency will collect results and submit a report to the Office of the Ministry of Agriculture and Rural Development for evaluation for a

maximum period of 3 months. If there is no rebuttal comment, the Minister will grant a protection certificate to the breeder. Transferring plant variety copyright to enterprises by the breeders is lawful and allowed by the State. Except in the case that this plant variety is essential and used in national security and defense purposes, the State will designate the transfer.

Other people should not use their parent seeds to create other variety, as this may violate the Intellectual Property Law. However, the majority of organizations and individuals only register the protection of F1 seed production, so the parent seed protection is abused due to no registration. If detecting any piracy, the breeders should require the trespasser to stop breeding and suggest him to pay for the copyright. If the trespasser does not meet with these requirements, the breeders should request an intervention by law.

SOME DIFFICULTIES IN THE PROTECTION OF PLANT VARIETY COPYRIGHT

Although achieving some progress in the plant variety protection, there is a worrying fact that the Cuu Long Delta Rice Research Institute the unit supplying 70% of the country's rice seeds market share, is not protected by copyright.

There is no assessment to the development level of agriculture, farmers' awareness and beneficiaries of scientific products to judge the current situation of agricultural product protection in the country. The beneficiaries in the agricultural scientific and technological achievements are poor farmers and small producers who live in scattered areas. The country has to pay extra money to these people if they are to listen to presentations on new technologies.

The second reason is the agricultural science and technology products are very easy to be "copied". It is conceivable that the most popular products at present are seeds, where the varieties being used on a large scale by the farmers are domesticated ones that they can propagate by themselves.

The third reason is that the scientists give the seeds to each other only by changing name of the evaluated variety in the evaluation process but the variety copyright belongs to someone else. Currently, the rice varieties produced are presented before issuing the provisions on intellectual property. According to the provisions of new plant variety protection, the varieties which have been widely known in production are not entitled to registration, before being commercialized. But it is very difficult to implement since there is no supervision.

HOW TO PROTECT THE RIGHTS OF SEED SELECTORS?

After Vietnam joined the WTO, there is a series of documents related to interested intellectual property issues. Previously, the Government issued the Decree on Plant Variety Protection and newly issued the Intellectual Property Law. But the problem is that there is no implementation supervision system. There are no agricultural breeders to collect fees from their copyrights, even though they registered the protection. Most of the transfer agreements are made at a late payment.

To ensure effective implementation of intellectual property in agriculture, the scientists have to create products with capability of high protection, especially hybrid varieties. The scientists need to reorganize the production: Seed supply systems and services should be a base to sign the contract and, more importantly, to raise the farmers' intellectual level so that they can cooperate

to implement such protection issues. Each variety is often protected for 20 years as prescribed by international regulations. But in Vietnam, if done well, the copyright fees are to be collected only in the first year. The farmers can breed the varieties in the next production seasons by themselves.

The status of "clear" copyright at a certain angle is derived from the people who created the products. Therefore, the scientists have to be wary of each other, and organize an evaluation by themselves for promising varieties on their consistency and distinctiveness to be able to timely make opponents to fake products. The authorities must reorganize themselves into evaluation groups, with a breeder in each group. Each breeder can supervise this work store varieties to ensure that varieties are well-protected. Thus, protection strategies should be implemented in a long term.

SEED RESEARCHES AND COMMERCIALIZATION RESULTS OF THE VIETNAM ACADEMY OF AGRICULTURAL SCIENCES (VAAS)

In recent years, in light of the important role of variety copyright protection and transfer in the process of new variety development and expansion, the Vietnam Academy of Agricultural Sciences has focused on the production and transfer of the copyright to businesses.

In year 2013-2015, the Vietnam Academy of Agricultural Sciences had 50 plant varieties officially recognized, 70 varieties recognized for trial production, in which the copyright and trading authorization of 34 plant varieties with the total value of over 90 billion VND (26 rice varieties; 8 maize varieties) were transferred to 12 enterprises. This is a very-high ratio for commercialized products so far, it shows the interested orientation by "demands" and improved research quality.

Particularly in 2015, the Institute produced and transferred 8,105 tons of super-elite rice varieties, elite rice varieties and certified varieties in the whole country; 3,437 tons of maize varieties; 1,500 tons of potatoes; 1,000 tons of edible cannas; 1,200 tons of batata branches for breeding; 1,000 tons of bean seeds; 01 ton of vegetable seeds of all kinds; millions of grafted tomato seedlings; 2.0 million lily bulbs; 15 million flower seedlings (chrysanthemum, phaleanopsis, gerbera); hundreds of thousands of tulips bulbs; 10 million tea seedlings of all kinds; 2.0 million fruit plant seedlings; 2.8 million industrial plant seedlings of all kinds (rubber, cashew, cocoa, grafted coffee, sowed robusta coffee, pepper, grafted avocado, sugarcane). In addition, the Institute also provided 14,836 kg of robusta coffee seeds, 300,000 strawberry beards to Central Highlands; provided hybrid strawberry seeds F1-VH15 and GQ2 enough for planting in 55 hectares to the Northern provinces.

In 2015, the Institute has transferred the copyrights of four high-quality short-term rice varieties with transfer fees of nearly 4 billion VND; the copyright of the hybrid maize variety LVN 102 by 4.2 billion VND; the right to distribute the hybrid maize variety A380 to Dai Thanh Company, the HT119 variety to Bac Giang Agriculture Technical Supplies Joint Stock Company, the LVN 111 variety to Central Plant Protection Joint Stock Company No.1 with a total value of up to several tens of billion VND; 2 processing procedures of watermelons, dragon fruits and pineapples to Noibai Catering Services JSC with a total value of billions VND.

SOME CASES OF SUCCESSFUL TRANSFER OF NEW PLANT VARIETY COPYRIGHTS

For rice varieties, Member Institutes of the Vietnam Academy of Agricultural Sciences, such as Field Crops Research Institute, have transferred the copyrights and authorized the trade of 16 rice varieties to 14 seed businesses with a total value of 13,130 billion VND. The Cuu Long Delta Rice Research Institute has transferred the copyrights and authorized the trade of 10 rice varieties to 6 seed businesses with a total value of 9.2 billion VND. The Institute registered new plant variety protection for 06 rice varieties in the Southern regions, including: OM5464, OM9921, OM9916, OM6932, OM88017 and OM9915 and asked for protection of 27 varieties (application has been accepted). The Institute has transferred the seed exclusive development to a number of seed enterprises as follows: The OM8017 variety is transferred to Thai Binh Seed Company, the copyrights of 03 varieties (OM7347, OM137, OM10373) are transferred to Dien Ban Corporation and 2 varieties will be transferred to Nha Ho Seed Joint Stock Company (OM373 and OM345).

Since the seed manufacturers have different capabilities, this resulted in many small businesses. Thus, for current rice varieties, there are two forms of popular copyright transfer. The first is the transfer of copyright or protection certificate ownership for large enterprises that have capacities of a large seed production and can supply a large volume of seeds to ecological areas. The second is authorizing the seed exclusive production and trading by specific geographic regions to smaller enterprises who mainly supply the seeds at a local level. In addition, there is a form that the Research institutes implement capital contribution contracts by their exclusive rights in seed production and trading with joint-stock businesses to expand new varieties.

For maize varieties, the National Maize Research Institute of Vietnam has coordinated to transfer the copyrights and authorize trading of 8 maize varieties and Process of creating double haploid lines by anther culture to 12 seed businesses. The total contract value is nearly 70 billion VND.

For peanut varieties, the Field Crop Research Institute has firstly transferred the copyright of the hybrid peanut varieties L26 to Agrimex Nghe An Joint Stock Company with a contract value of 500 million VND.

For fruit varieties, Hoang Hau Dragon Fruit Farm Company Limited (Binh Thuan) has firstly registered to purchase the copyright of the LD5 dragon fruit seeds by 2 billion VND of the Southern Fruit Research Institute. The LD5 purple dragon fruit variety will be announced for its copyright and commercialized. With dominant properties such as big and strong mature branches, capability of flowering strongly and almost year-round, capability of naturally pollination to produce fruits. On average, each fruit has a weight of 351.2 grams, ovoid shape, fruit peel is light red, bright and quite shiny, high vitamin C content (average of 18.27mg per 100ml of juice), and feed rate is up to 74.68%. The average yield reaches 36.70 kg per pillar per year in Tien Giang, 24.08 kg per pillar per year in Long An and 23.47 kg per pillar per year in Ba Ria-Vung Tau (36 months-old plants), better than the other varieties of dragon fruit. The LD5 purple dragon fruit variety was issued the Decision on Recognizing Varieties for Trial Production on May 19, 2011 and the Certificate of New Plant Variety Protection on February 27, 2012 by the Department of Crop Production under the Ministry of Agriculture and Rural Development.

CONCLUSION

Vietnam has gained many achievements in research and development of new varieties in the green revolution. New plant varieties are the key to success of Vietnam's agriculture for decades. Although the legal documents on the protection of seed intellectual property copyrights have been issued, the proportion of protected varieties is still small due to many different reasons. Many of Vietnam's plant varieties have been studied but a small number of them can be expanded into large areas and are competed by imported varieties. The variety protection issues are very urgent and need to be promoted stronger. Currently, the protected varieties show their better capabilities of popularization, expansion and commercialization.

Recommendations for promoting plant variety's copyright protection are that the State should complete legal documents on plant varieties, including the Law on Plant Varieties, and promote capacity of the seed control system in the international economic integration. Besides, the State should promote international exchanges and cooperation on the plant variety protection in order to promote the international trade of agricultural products.

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