ENVIRONMENTAL SCIENCE & POLICY 37 (2014) 158–160

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/envsci

Short communication

International plant trade associated risks: Laissez-faire or novel solutions

Jarkko Hantula *, *Michael M. Müller*, *Jussi Uusivuori*

Finnish Forest Research Institute Metla, Vantaa Unit, P.O. Box 18, 01301 Vantaa, Finland

ARTICLE INFO

Available online 17 October 2013

Keywords:
International trade
Pest
Pathogen
Alien species
Plant trade

ABSTRACT

The trade of plants and plant products is globally the most important pathway for alien pests and pathogens causing considerable damage to plant health. The introductions have increased exponentially in Europe, and continued even in Australia, where extreme quarantine efforts are implemented. The commercial actors in international plant trade lack a strong motive to reduce pest and pathogen risks as the true costs of the practiced trade are not internalized in the pricing of the products but footed to taxpayers and land owners. Therefore a shared responsibility of international plant traders is suggested to complement the current legislative restrictions in controlling exotic pests and pathogens.

1. Introduction

The introduction of non-native pests and pathogens has caused dramatic destruction and remarkable change to nature since the early 19th century. For example, in Europe the two most recent examples are the sudden larch death (Brasier and Webber, 2010) and the ongoing ash decline (Zhao et al., 2012).

The economic costs caused by introduced exotics are substantial. Estimates of the damage potentially caused by the ongoing Asian longhorn beetle epidemic in large US cities are as high as $669 billion (Nowak et al., 2001), and even the annual cost attributed to Dutch elm disease on the small island of Gotland, Sweden (ca. 3000 km^2) is estimated to be 8–215 million euros (Gren et al., 2009).

In spite of existing laws and international cooperation, based on quarantine species lists, alien species introduction increases exponentially (Roques et al., 2009; Santini et al., 2013). New findings indicate that since the 1980', over 70% of the exotic plant pathogens identified in Europe gained entry via infected live plants (Santini et al., 2013).

Regardless of this trend, the international trade of plants-for-planting has grown under the false assumption that the spread of exotic pathogens and pests could be managed by border controls and quarantine lists. The problem was highlighted two years ago by the arrival of myrtle rust to Australia (Carnegie et al., 2010) despite the country's advanced warning system and a strict border. The rust is now causing damage described as an "ecological holocaust" (FABI, http://www.forestry.co.za/disease-warning-puccinia-psidii/ (last accessed in 26.03.13)).

Eradicating exotic pests and pathogens is expensive, even in the early stages of escape. The Finnish national food safety organization (Evira) estimates that a single detection of the pine wood nematode would trigger an eradication program with a cost range of 5–19 million euros (Anon., 2011). This cost would arise from the destruction and burning of all potential host tree species within three km around the tree in which the pest was observed.

* *Corresponding author*. Tel.: +358 40 801 5419.
E-mail address: Jarkko.hantula@metla.fi (J. Hantula).
1462-9011/$ – see front matter
http://dx.doi.org/10.1016/j.envsci.2013.09.011

In response to the ineffectiveness of current phytosanitary practices, more than 100 scientists have already signed a declaration (IUFRO) in which they propose "a phasing out of all trade in plants and plant products determined to be of high risk to forested ecosystems but low overall economic benefit". However, because the global trade of plants is based on lucrative business opportunities and on the canon of free trade, pressure from publicized biological data alone is unlikely to bring about necessary changes in policy and behavior. Obviously, new initiatives are needed and should be encouraged.

Currently, land owners and taxpayers foot the bill of damage caused by exotic plant pests while plant importers ultimately responsible for the introduction avoid penalty under the protective umbrella of free-trade. Only in few cases has an individual shipment or importer of plants or plant products been identified as the source of a pest. Thus, the difficulties and costs of identifying and penalizing those responsible for an introduction pose considerable obstacles to detection, prosecution and enforcement. An additional point to consider is that the full costs of an ecological disaster due to an invasive could not be met by even the largest of firms currently operating in this industry, and hardly even by the insurance sector.

The case of the invasives is a sad example of negative environmental externalities caused by international trade (Stewart, 1992). Externatilies arise because the true costs of the practiced trade are not internalized in the pricing of the products. Based on the points above, penalizing the traders is not a feasible option. An outright global banning of the trade in exotics would also be unrealistic and costly to enforce, and would likely lead into illegal trade and corruption. Besides, illegalizing all trade in exotic plants would not be optimal as it would also target high-value and low risk trade.

In the economic tool-kit of cost-efficient policy instruments against negative externalities one can find measures such as Pigouvian taxes or the cap-and-trade system (Stavins, 2001). Corrective import taxes levied on the exotics commerce could be one possibility, but these taxes would unlikely reflect the true costs of the damage and they would also run against the free-trade principle. As for the cap-and-trade system, the difficulties lie in the determination of an optimal level of the cap.

2. A novel policy tool

We propose a novel policy tool, which would aim at a mechanism of shared responsibility of the full costs of the plant trade. In order to achieve this goal, all international plant trade would be based on licenses. These licenses would be freely – without a quota – purchasable by the market participants from an international body which would also fund the income from license fees and maintain a register of the trade. The level of these fees, i.e. the prices of the licenses, would be a calculated sum of the economic losses caused by outbreaks of alien pests and diseases. The net income, after deducting administrative, damage inventory/monitoring and verification as well as eradication costs, from the fees would be forwarded to parties who suffer the losses due to plant trade. A schematic presentation of the model is provided in Fig. 1.

To implement the mechanism, an independent expert group should collect data from all the pertinent economic losses that have actualized world-wide during previous the five to ten years, and these losses would be divided by the amount of plant trade during that period to obtain the adequate starting price for the license. Field-level damage inspection and related reimbursement claims would be based on appraisals provided by impartial auditing agencies, along similar lines as currently are followed to evaluate windfall timber damages between forest owners and insurance companies in e.g. the Nordic countries. In the work of these

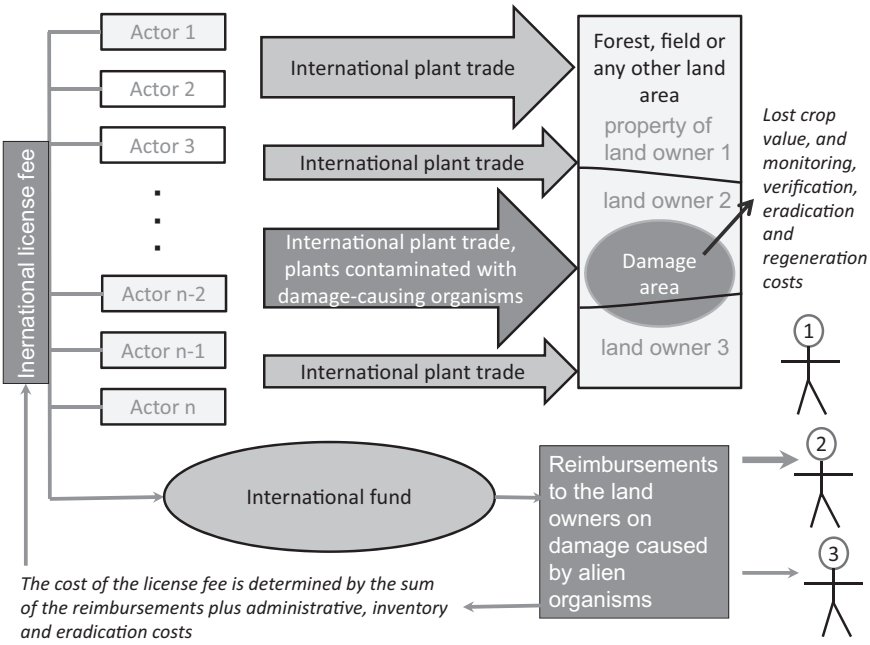

Fig. 1 – A schematic presentation of the license fee concept for international plant trade.

agencies, a critical point would be to determine the line between damages caused by pest infestations due to international plant trade and other causes. The reimbursements would include direct economic costs due to e.g. lost value of timber as well as eradication of the introduced pest and regeneration of the infested area.

The single unit for the license system in plant trade should be jointly selected and agreed upon. It could be based on numbers of traded plants and agreed equivalents of possible other plant products.

New information from truly paid reimbursements by the fund would continuously replace older information in the data pool to give rise to updated license prices. In this system, current traders would pay for the 'sins' of previous years' traders, but the moving average feature of the system would dampen the annual variation of the license fees and thus improve predictability for the traders. As the internalizing of the economic losses into the international plant trade would increase plant prices, the amount of trade would go down, thus eliminating first the trade with the least overall economic benefits and highest risks. The reduction of the trade basis would continue to put pressure on the plant prices, until a level is reached where the true social costs would match the social benefits. The system would thus translate biological knowledge into the language of economics and politics.

REFERENCES

Anon., 2011. Valmiussuunnitelma, Eviran julkaisuja 7/2011. , (in Finnish).

Brasier, C., Webber, J., 2010. An aggressive and unpredictable fungal pathogen is devastating larch plantations in Britain. Its remarkably broad host range, and the possibility. Nature 466, 824–825.

Carnegie, A.J., Lidbetter, J.R., Walker, J., Horwood, M.A., Tesoriero, L., Glen, M., Priest, M.J., 2010. *Uredo rangelii*, a taxon in the guava rust complex, newly recorded on Myrtaceae in Australia Australasian. Plant Pathology 39, 463–466.

Gren, I.-M., Isacs, L., Carlsson, M., 2009. Costs of alien invasive species in Sweden. Ambio 38, 135–140.

IUFRO. http://www.iufro.org/science/divisions/division-7/70000/publications/montesclaros-declaration/ (last accessed in 26.03.13).

Nowak, D.J., Pasek, J.E., Sequeira, R.A., Crane, D.E., Mastro, V.C., 2001. Potential effect of *Anoplophora glabripennis* (Coleoptera: Cerambycidae) on urban trees in the United States. Journal of Economic Entomology 94, 116–122.

Roques, A., Rabitsch, W., Rasplus, J.-Y., Lopez-Vaamonde, C., Nentwig, W., Kenis, M., 2009. Alien terrestrial invertebrates of Europe. In: Drake, J.A. (Ed.), Handbook of Alien Species in Europe, DAISIE. Invading Nature, Series in Invasion Ecology, vol. 3. Springer, Berlin, Germany, pp. 63–79.

Santini, A., Ghelardini, L., De Pace, C., Desprez-Loustau, M.L., Capretti, P., Chandelier, A., Cech, T., Chira, D., Diamandis, S., Gaitniekis, T., Hantula, J., Holdenrieder, O., Jankovsky, L., Jung, T., Jurc, D., Kirisits, T., Kunca, A., Lygis, V., Malecka, M.B., Schmitz, S., Schumacher, J., Solheim, H., Solla, A., Szabo, I., Tsopelas, P., Vannini, A., Vettraino, A.M., Webber, J., Woodward, S., Stenlid, J., 2013. Biogeographical patterns and determinants of invasion by forest pathogens in Europe. New Phytologist 197, 238–250.

Stavins, R.N., 2001. Experience with market-based environmental policy instruments. Resources for the Future Discussion Paper 01-58. .

Stewart, R.B., 1992. International trade and environment: lessons from the federal experience. Washington and Lee Law Review 49, 1329–1371.

Zhao, Y.-J., Hosoya, T., Baral, H.-O., Hosaka, K., Kakishima, M., 2012. *Hymenoscyphus pseudoalbidus*, the correct name for *Lambertella albida* reported from Japan. Mycotaxon 122, 25–41.

Jarkko Hantula is a professor of forest pathology at the Finnish Forest Research Institute Metla. He is one of the initiators of the Montesclaros Declaration.

Michael M. Müller is a senior scientist at the Finnish Forest Research Institute Metla. He is one of the initiators of the Montesclaros Declaration.

Jussi Uusivuori is a professor of forest economics and policy at the Finnish Forest Research Institute Metla.