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Measuring the Consistency of Phytosanitary Measures

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Abstract

The paper presents a model for quantifying quarantine-related phytosanitary measures by combining the two basic components of pest risk assessment, probability of establishment and economic effects, into a single management framework, Iso-Risk. The model provides a systematic and objective basis for defining and measuring acceptable risk and for justifying quarantine actions relative to acceptable risk. This can then be used to measure consistency of phytosanitary measures. The Iso-Risk framework is applied using a database of USDA phytosanitary risk assessments. The results show that the USDA risk assessment system produces assessments that are not consistent across a range of intermediate values for consequence or likelihood of occurrence.

Keywords: Iso-Risk, phytosanitary risk assessment, pest risk assessment

Introduction

One of the outcomes of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) was the provision for reductions in a range of trade barriers. In particular, certain types of barriers, such as tariffs, export subsidies, embargoes, import bans, quotas, supply management regimes, domestic price supports, licensing and exchange controls, were able to be dealt with by converting them into 'tariff-equivalent' levels of protection through a system of 'tariffication'. The key success of this approach was that different 'quantifiable' trade barriers could then be compared, reduced or negotiated in a common framework of tariffs. What remained to be resolved after the Uruguay Round was a range of trade barriers that were largely non-quantifiable in terms of tariff-equivalent levels of protection. These barriers, termed 'Technical Barriers to Trade' (TBT), included rules and standards directed at health, safety or the environment.

What differentiates TBTs from quantifiable trade barriers is that they are not specifically targeted at trade or production issues. Under GATT rules, countries are 'generally allowed' to adopt health, safety or environmental policies which take precedence over other rules. The caveat to this, however, is that these policies are only allowed as long as the purpose of the policy or standard is to meet a legitimate domestic objective, and as long as domestic and foreign producers are treated in the same manner. Among the most prevalent types of TBT's are those that deal with concerns about human, animal and or plant health (Hillman, 1978; 1991). With the reduction in quantifiable barriers to trade, concern has been raised that countries will turn to TBT's as a way of blocking imports rather than just meeting legitimate sanitary and phytosanitary concerns (Ndayisenga and Kinsey, 1994). This concern has led to major efforts internationally to ensure that sanitary and phytosanitary measures do not evolve as major trade barriers.

Under the World Trade Organisation (WTO), TBT's related to animal and plant health issues are dealt with under the Sanitary and Phytosanitary (SPS) Agreement. Under the umbrella of the SPS Agreement, the International Plant Protection Convention (IPPC) has produced standards for determining the Appropriate Level of Protection (ALP), or justified quarantine measures, for plants (FAO 1996). The major problem faced by the IPPC is the lack of a system that can convert diverse technical or scientific barriers related to plant health into a common framework which would allow comparison of quarantine measures within a trade, or economic, forum. A common theme of the activity of the IPPC is a need to develop systems that will provide a measure of the Appropriate Level of Protection (ALP). This in turn will show whether health or phytosanitary standards are being imposed in a way that is consistent with both internal and external standards.

Another important change with the Uruguay Round has been a move to focus on risk assessment and management with an overall objective of minimising negative trade impacts (Papasolomontos, 1993). This is a considerable departure from past practice in the quarantine area. Historically SPS has been the domain of scientists and the key criteria for applying trade barriers has been an assessment of probability of occurrence (Smith, 1993; Patterson, 1990). This is an objective, but one-sided application of standards in a trading environment. Under the Uruguay Round, risk assessment now requires consideration of economic consequences as well as probability of occurrence. In addition, risk management now requires the consideration of trade-offs in probability of establishment and economic consequences, and in the context of choosing the least trade-distorting path.

The major problem presented by TBT's is the lack of a system which can convert diverse technical barriers related to plant or animal health into a common framework which allows for comparison in a trade forum. In other words, what kind of a measure will adequately combine the key features of risk analysis, risk of introduction and economic consequences, in a way, which facilitates comparison and negotiation? The greatest need is to convert barriers to values that are common in a trade environment, typically currency measures. A way for eliciting the value of a TBT is by measuring implicit or explicit economic effects that are created by the barrier. This could be done in the context of measuring the value of events related to a TBT. Examples of this could include measuring the additional costs associated with compliance with a regulation, new labelling or packaging, or reducing residues. This could also be done in the context of measuring the value of an outcome without a technical barrier in place. In this case the consequences of an economic impact such as a pest infestation could be measured.

An important component of assessing risk or levels of protection is a methodology that uses both economic effects and probability of introduction to manage risk (FAO, 1996). Although the FAO's standards do not specify how to combine economic effects and probability of introduction, the implication is that they should be considered together to measure 'Pest Risk'. The Plant Protection and Quarantine programme of the Animal and Plant Health Inspection Service (APHIS-PPQ) of the United States Department of Agriculture is one of the few regulatory agencies to develop and implement a set of standardised guidelines for pest risk assessment based on the FAO's standards. The purpose of this paper is to study the application of the APHIS-PPQ risk assessment system, in the context of the FAO standards and in the context of how well characterises pest risk for quarantine decisions.

USDA Qualitative Pest Risk Assessment

The Plant Protection and Quarantine programme of the Animal and Plant Health Inspection Service (APHIS-PPQ) of the United States Department of Agriculture has developed qualitative guidelines for pest risk assessment. The first guidelines came out in 1995 (USDA, 1995), and these were updated in 2000 (USDA, 2000). The U.S. guidelines provide the basis for ranking pest risk based on potential consequence of introduction and likelihood of introduction. Potential consequence of introduction is comprised of five 'risk elements', climate-host interaction, host range, dispersal potential, economic impact and environmental impact. A similar process is carried out for likelihood of introduction, but with six risk elements, quantity of commodity imported, survival of post-harvest treatment, survival during shipment, likelihood of escaping detection on entry, likelihood of moving to a suitable habitat, and likelihood of finding a suitable host.

The process followed by APHIS-PPQ is to give each of the risk elements a rating of high, medium or low. Each of these qualitative ratings is given a numerical score, with a rating of high given 3 points, medium 2 points and low 1 point. This can be illustrated using an example of a qualitative risk assessment for the import of Purple

Passion Fruit (Passiflora edulis) from Chile to the U.S. (Firko and Podleckis, 1996). Three potential pests associated with Purple Passionfruit were identified *Ascochyta passiflorae, Brevipalpus chilensis,* and *Ceratitis capitata*. Table 1 outlines the risk ratings for consequence of introduction and likelihood of introduction, following the format of a qualitative pest risk assessment outlined in USDA (2000). The number in brackets after the risk rating is the numeric value for the ranking that is used to calculate the cumulative risk rating.

Table 1: Risk Assessment for Purple Passionfruit

Risk Element	*Ascochyta passiflorae*	*Brevipalpus chilensis*	*Ceratitis capitata*.
Consequence of Introduction			
Climate/Host	Medium (2)	High (3)	High (3)
Host Range	Low (1)	High (3)	High (3)
Dispersal	Medium (2)	Medium (2)	High (3)
Economic	Medium (2)	High (3)	High (3)
Environmental	Medium (2)	Medium (2)	High (3)
Likelihood of Introduction			
Quantity Imported	Low (1)	Low (1)	Low (1)
Survive Post-Harvest Treatment	High (3)	High (3)	High (3)
Survive Shipment	High (3)	High (3)	High (3)
Not Detected on Entry	Low (1)	Medium (2)	High (3)
Moved to Suitable Habitat	Low (1)	High (3)	High (3)
Find Suitable Host	Low (1)	High (3)	High (3)
Pest Risk Potential	19	28	31

A cumulative score for the five risk elements in consequence of introduction and for the six risk elements likelihood of introduction is then calculated, resulting in a new risk rating of high, medium or low, again with the same corresponding risk scores for each as before (Table 2). As can be seen in Table 2, there was a change in risk scoring between the guidelines developed in 1995 and 2000. The effect of the changes in 2000 was that a higher score was needed to get into high or medium risk rating.

Table 2: Cumulative Risk Element Score

Risk Rating	1995	2000	Risk Score (1995)
Consequences of Introduction			
Low	5 - 7	5 – 8	1
Medium	8 - 11	9 – 12	2
High	12 - 15	12 – 15	3
Likelihood of Introduction			
Low	6 - 9	6 – 9	1
Medium	10 - 13	10 – 14	2
High	14 - 18	15 – 18	3

To get an overall risk rating, likelihood of introduction and consequences of introduction are combined. In the 1995 guidelines this is done by assigning a risk score to the risk rating given to consequences of introduction and likelihood of introduction (Table 2). A cumulative score based on the risk score for each component (consequence of introduction score plus the likelihood of introduction score) was then calculated. The cumulative value is then rated according to Table 3.

Table 3: Pest Risk Potential – 1995 and 2000 Guidelines

Risk Category	1995 Cumulative Risk Score	2000 Cumulative Risk Element Score	Phytosanitary Measures
Low	2	11 to18	Pest will typically not require specific mitigations measures; the port of entry inspection to which all imported commodities are subjected can be expected to provide sufficient phytosanitary security.
Medium	3 - 4	19 to 26	Specific phytosanitary measure may be necessary.
High	5 - 6	27 to 33	Specific phytosanitary measures are strongly recommended. Port of entry inspection is not considered sufficient to provide phytosanitary security.

In 2000 the guidelines were changed to drop the last step of the process, where a cumulative risk score for each component (likelihood of introduction and consequences of introduction) was assigned (USDA, 2000). In the updated guidelines, likelihood of introduction and consequences of introduction are combined by calculating a cumulative value based on the risk score for each component. The cumulative value provides a pest risk potential, rated high, medium or low depending on the score. The cumulative value for the Consequences of Introduction and the Likelihood of Introduction produce the Baseline Pest Risk Potential (PRP) value. The interpretation of PRP is shown in Table 3.

APHIS-PPQ has been carrying out risk assessments using this qualitative risk assessment system since 1995. This has resulted one of the only extensive databases of pest risk assessments based on a common assessment framework. Over this period of time there has not been any published research that evaluates how well the qualitative risk assessment system delivers consistency of quarantine decisions over time or across commodities and their associated pests. In order to be able to evaluate consistency of quarantine decisions, a system for comparing risk assessments is required. One system that can evaluate the consistency of quarantine decisions is the Iso-Risk framework.

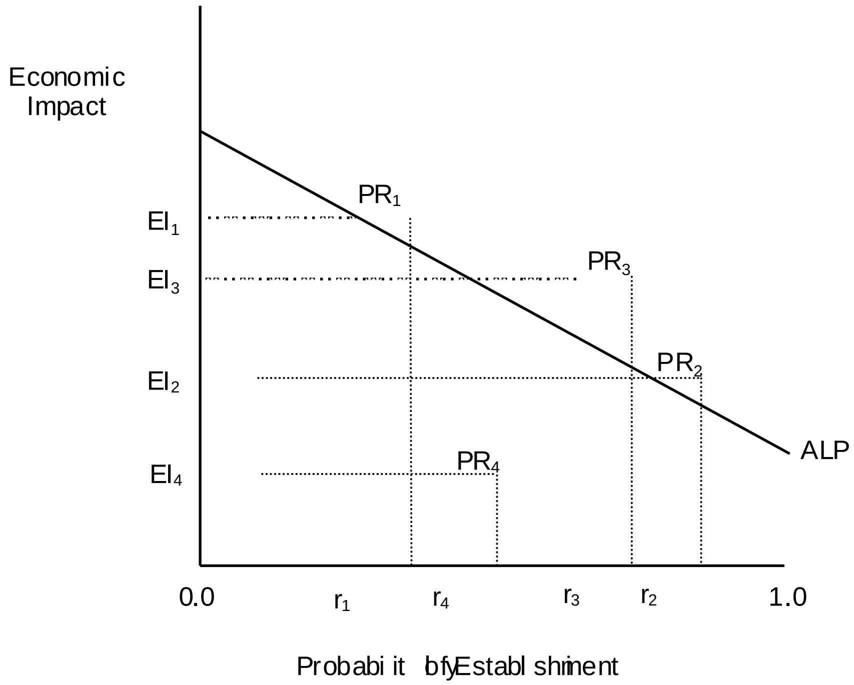
Iso-Risk Framework

The Iso-Risk framework arose out of discussions during the the development of the draft Pest Risk Analysis Standards by the IPPC working group (Orr, 1995), and was further developed by Bigsby (2001; 1996), Bigsby and Crequer (1998), and Bigsby and Whyte (1998; 2001). The Iso-Risk framework is based on the FAO (1996) guidelines on pest risk assessment which require a measurement of is Economic Effect (*EF*) and Probability of Introduction (*PI*). Although the FAO pest risk assessment guidelines do not mention any way of combining measurements of economic impact and likelihood of introduction into a single measure of the risk presented by a potential pest, a common way for these two factors to be combined is to calculate Pest Risk (*PR*) as,

$$PR = EF \times PI$$

Use of both the probability and consequences of a particular event to express risk appears in many areas of risk analysis (Kaplan and Garrick, 1981; Cohrssen and Covello, 1989; Miller et al., 1993; Ministry of Health, 1996). Calculated this way, Pest Risk represents the expected value of the economic effect of pest introduction during the time period for which the probability of introduction has been assessed. If a quarantine authority used this definition for Pest Risk, risk management options would be considered in the context of some benchmark or acceptable level of Pest Risk and the need to alter the probability of introduction or the economic consequences of establishment to meet the benchmark. A critical component is the establishment of a benchmark level of acceptable pest risk or Acceptable Level of Protection (ALP), so that subsequent management strategies can be systematically evaluated against the benchmark. The Iso-Risk framework for a particular pest is illustrated in Figure 1.

Figure 1: Iso-Risk Framework



Pest Risk is depicted in Figure 1 as a point estimate or single value. In practice, there would be a problem in providing only a point estimate because it gives no quantitative picture of the uncertainty surrounding either the probability of establishment or economic impact values used in the pest risk estimate. This means that there is no information on whether a particular estimate represents the most likely value, or one of a host of equally likely values over a wide range [for example, Cohrssen and Covello, 1989]. Since pest risk is actually based on a probability distribution for both risk of introduction and economic impact, rather than being a point estimate, a plot of pest risk would be an area. Given a distribution of outcomes, a decision maker would be in a position to make a better-informed assessment of the appropriate management actions for a particular pest than with only a point estimate.

In Figure 1, Pest 1, with an economic impact of EI_1 and a probability of establishment of r_1, has a pest risk of PR_1, where,

$$PR_1 = EI_1 \times r_1$$

Pest 2 has an economic impact of EI_2 and a probability of introduction of r_2. As can be seen in Figure 1, different pests, having different potential economic consequences and probability of introduction, may still share the same value of pest risk. Both PR_1 and PR_2 lie on the same line where all combinations of ($EI_i \times r_i$) have the same value (hence, the 'Iso-Risk' line). Note that the Iso-Risk line is straight only when both the x and y axes are plotted with logarithmic scales.

A key requirement for carrying out risk assessment, or determining entry conditions, is a pre-determined benchmark level of pest risk, or ALP, from which to base decisions. In Figure 1 there will be an infinite number of Iso-Risk lines representing different levels of Pest Risk, with higher Iso-Risk lines indicating higher Pest Risk. Iso-Risk lines allow pests to be compared to each other, and compared to a particular acceptable level of Pest Risk. This ability to compare in turn provides the basis for determining appropriate actions. In particular, the result of pest risk management should be a Pest Risk that does not exceed the ALP, with a reasonable level of confidence. In the context of Figure 1, since all points on an Iso-Risk line have the same expected value, the ALP represents the highest Iso-Risk line that will be accepted by a quarantine authority before some type of quarantine action needs to be undertaken.

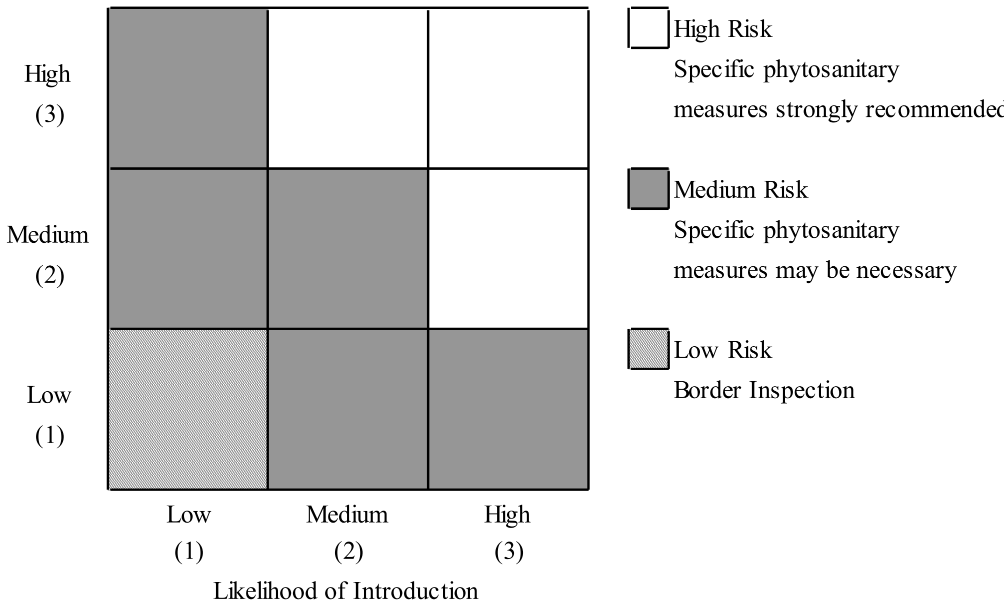
Given this definition, individual pests can be evaluated against an ALP. If the Pest Risk of a particular pest is greater than the ALP, actions should be taken to reduce Pest Risk to the ALP. For example, if the Iso-Risk line in Figure 1 has been determined to be the ALP, a pest with a Pest Risk of PR_3 would be subject to actions to reduce the risk to acceptable levels. The pest corresponding to PR_4 falls within acceptable limits, and requires no additional quarantine actions.

APHIS-PPQ Qualitative Risk Assessment and Iso-Risk

The Iso-Risk framework shown in Figure 1 is based on continuous values for economic impact and likelihood of introduction, while the APHIS-PPQ system results in discrete, categorical values to express Pest Risk. However, as long as pest risk is expressed in terms of likelihood of introduction and economic impact, qualitative values used to make the scoring system in Table 2 can be adapted to fit the Iso-Risk model in Figure 1.

For the 1995 guidelines, the scoring system outlined in Table 3 can be formatted in the Iso-Risk framework by taking the 1995 values in Table 2 and adapting them to fit Figure 1. The result is shown in Figure 2. Ordinal values like high-medium-low can be incorporated into the Iso-Risk framework, but iso-risk line becomes less distinct. In the case of Figure 2, the Iso-Risk line (ALP) lies above the square denoted "Border Inspection".

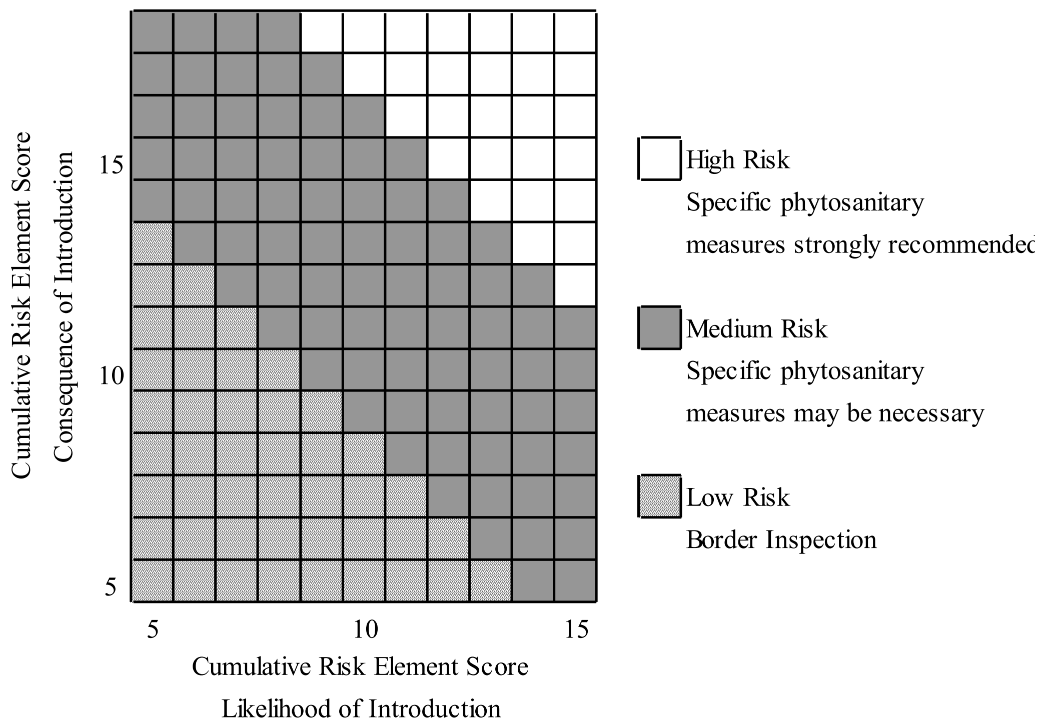
Figure 2: Iso-Risk and Qualitative Risk Assessment – 1995 Guidelines



Since the qualitative assessment in this case is itself in the form of a recommendation to consider action rather than a requirement for action, the iso-risk line is even more indistinct. The guidelines only suggest that a pest presenting a risk above the low-low ranking be considered for additional phytosanitary measures. This would presumable be based on a refinement of the qualitative assessment contained in the guidelines, or on additional information not used in the qualitative assessment.

If the raw risk scores for likelihood of introduction and consequences of introduction from the 2000 guidelines are used rather than the high, medium and low ranking, the APHIS-PPQ system of scoring can be better adapted to the Iso-Risk framework and to the axes in Figure 1. As is shown in Figure 3, the APHIS-PPQ system allows for a maximum score for consequence of introduction of 15 and for likelihood of introduction of 18. Based on how the APHIS-PPQ guidelines translate combinations of cumulative risk element scores for likelihood of introduction and consequences of introduction into risk management options, Figure 3 can also be separated into risk management zones (Bigsby and Whyte, 1998).

Figure 3: Iso-Risk and Qualitative Risk Assessment – 2000 Guidelines



Since less crude measures of economic impact and probability of establishment are used compared to Figure 2, it is easier to identify combinations of these two factors that represent similar levels of risk. If Figure 3 is put in the context of Figure 1, the similarities in terms of Iso-Risk and management options can be seen. The major difference from Figure 1 is that there is now a zone of risk that creates a wide bound in which the actual, but undefined, Iso-Risk line lies. This wide bound arises due to the wide range of values from the cumulative risk element scores for either the consequence of introduction or the likelihood of introduction which are collapsed into "medium risk". In Figure 3, the Iso-Risk line/zone is defined by the shaded cells. Pests with risk values in the shaded cells represent unacceptable levels of risk for which quarantine measures might be undertaken.

There is no clear indication from the USDA (2000) of what ultimately qualifies as acceptable risk (eg. Border Inspection only) or unacceptable risk (eg. specific phytosanitary measures necessary). Since the qualitative assessment in this case is itself in the form of a recommendation to consider action rather than a requirement for action, the Iso-Risk line is even more indistinct. The guidelines only suggest that a pest presenting a risk above the low ranking be considered for additional phytosanitary measures. This would presumably be based on a refinement of the qualitative assessment contained in the guidelines, or on additional information not used in the qualitative assessment.

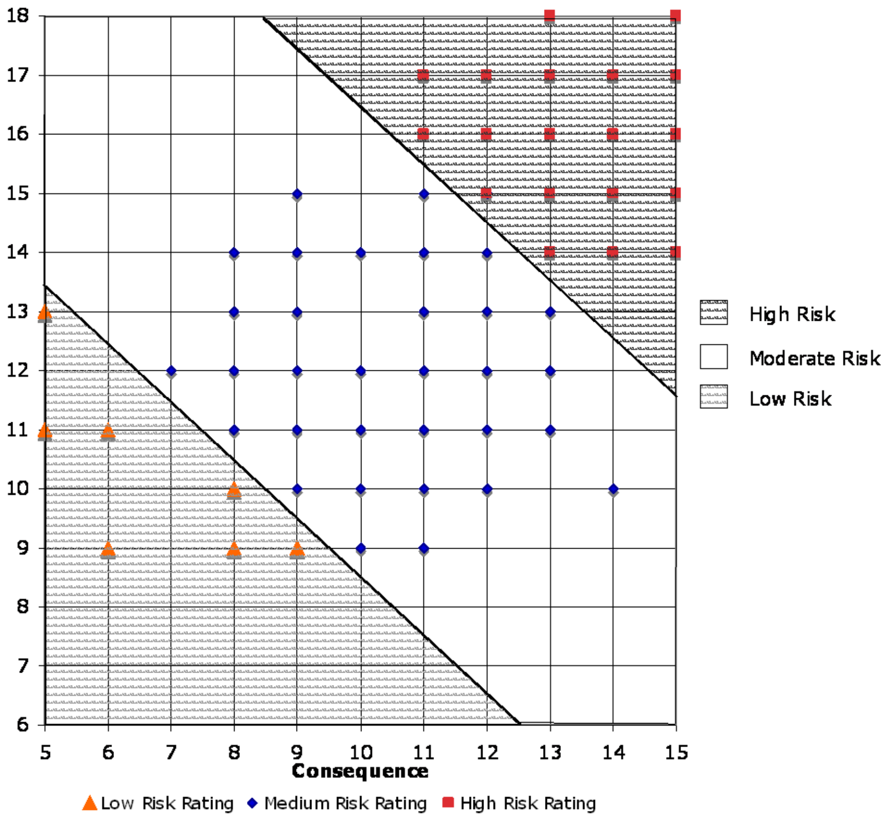
Another complicating factor is that the ordinal values are derived from a range of factors (risk elements) that have no common denominator. This means that ‘expected value’ measuring Pest Risk from combining an economic impact and a probability is not applicable here. Risk scores for consequence of introduction and likelihood of introduction can still be combined (eg. added or multiplied), but the resulting is something different than an expected value. The combined risk rating can still be used to rank a pest and to form an Iso-Risk line, but only relative to this risk rating system. As such, Figure 3 provides the basis for studying the consistency of quarantine recommendations arising from pest risk assessments done by APHIS-PPQ.

Methodology

APHIS-PPQ has carried out a number of 'Pathway Initiated Pest Risk Assessments'. These are risk assessments that are initiated because someone has asked to import a particular commodity into the U.S.A that is of potential quarantine concern. Since this is a commodity-based risk assessment, each commodity is assessed for the full range of potential pests that might associated with that commodity coming from a particular location. Using 43 pest risk assessments done by APHIS-PPQ between 1995 and 2004, a database covering 206 individual pests was developed. A spreadsheet was created to record the numerical risk score for each element in consequence of introduction and likelihood of introduction for each pest, and the final risk rating that was assigned to each pest from the risk assessment.

With this data, the cumulative risk scores for consequence of introduction and likelihood of introduction for each pest can be plotted similar to Figure 3. The difference between Figure 3 and the results shown in Figure 4 is that an x-y plot of the data means that each data point lies on the intersection between the values for likelihood of introduction and consequence of introduction rather than occupying a square.

Figure 4. Cumulative Risk Assessment – Updated 1995 Risk Ranking

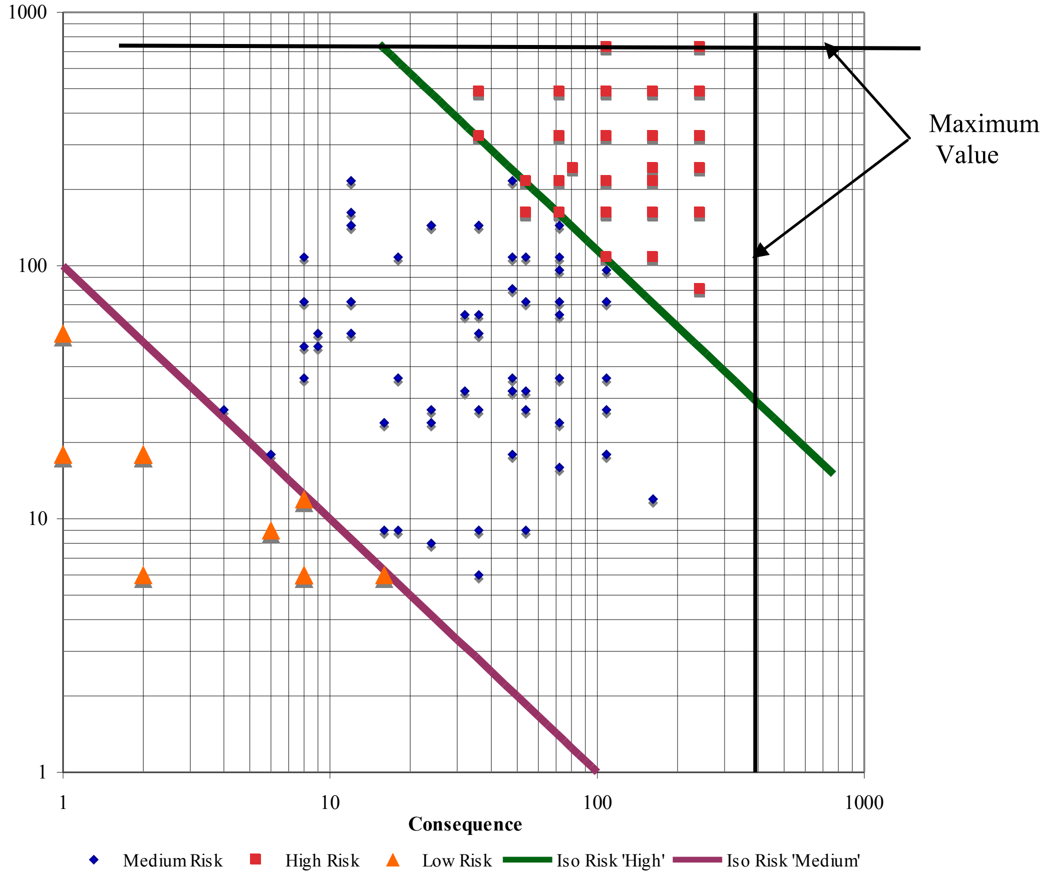


The location of data points facilitates the construction of Iso-Risk lines separating low risk from medium risk, and medium risk from high risk. In both cases, the Iso-Risk line has been drawn through the relevant midpoint between intersection points that sum to the values corresponding to the maximum value for the lower risk category and the minimum value for the higher risk category. For example, the Iso-Risk line between low and medium risk separates points that sum to 13 and 14.

In addition, the data points in Figure 4 were separated into groups by the final risk rating that was assigned to each pest from the risk assessment. In the case of the risk assessments done before 2000, the PRP for each pest was recalculated using the new definitions for 2000 (Table 3). While the minimum risk assessed to any pest in the original assessments was medium, the recalculation meant a number of pests now had a low risk rating. The creates the three groups in Figure 4. Note that the number of points in Figure 4 is less than 206 because many pests have the same cumulative risk scores.

An alternative to using the additive scores of APHIS-PPQ is to use multiplicative scores. This is done by multiplying each of the risk scores for consequence of introduction and likelihood of introduction. Since the maximum possible score for consequence of introduction is now 3^6 instead of 3 x 6 and 3^5 instead of 3 x 5 for likelihood of introduction, the axes need to be shown in log scale to be useful. The result is shown in Figure 5.

Figure 5: Multiplicative Risk Assessment – Updated 1995 Risk Ranking



Since the risk scores are now multiplied, the APHIS-PPQ definitions of what constitutes high-medium-low are no longer relevant and an alternative method of determining ALP needed to be used. The method used to determine the ALP in this paper is as follows. As in the Iso-Risk framework, the benchmark acceptable risk or ALP uses consequence multiplied by likelihood. The use of categorical values here means that no particular interpretation can be attached to the result, unlike Iso-Risk using actual values which results in an 'expected value' for ALP.

The basic strategy is to find a value for ALP that allocates all pests to the correct risk rating based on the APHIS-PPQ risk ratings from the assessments. To do this an arbitrary value for ALP was chosen as a starting point. Formulas were then created in Excel to allocate each pest to a medium or high risk rating depending on whether the product of consequence of introduction and likelihood of introduction was below (medium risk) or above (high risk) the arbitrary value of ALP. The resulting risk rating was then compared to the actual risk rating given to the pest in the APHIS-PPQ reports, and the percentage of 'correct' matches was calculated. Through a number of iterations, benchmark ALP's separating low from medium risk and medium from high risk were determined

Consistency of Quarantine Decisions

Purpose of a risk assessment system is twofold. One is to ensure that phytosanitary measures are justifiable according to objective standards. The other is to ensure that phytosanitary measures are the minimum necessary to modify economic consequence or likelihood of introduction so that PRP is reduced to an acceptable level. While the APHIS-PPQ system provides an objective risk assessment system, it is not apparent that qualitative risk assessment and choice of phytosanitary measures is linked.

One way of measuring whether quarantine measures are consistent would be to look a the quarantine measures that have been applied to a particular commodity, use the measure to modify the relevant parameter in the qualitative risk assessment system, and then use this to calculate 'post-quarantine' PRP. This could then be compared to the original PRP. In principle, one would expect that all pests with a high PRP would have measures that would reduce PRP to some acceptable level. By studying a number of risk assessment and phytosanitary measure combinations, the acceptable level of protection should be evident. The other way of measuring whether quarantine measures are consistent would be to look at pests with similar PRP and see whether the commodities they are associated with have had measures applied that reduces PRP to a similar extent or level.

To test this approach, a sample of six pests with a range of medium and high PRP was selected from the database. Using the APHIS database on phytosanitary measures by country and commodity, the relevant phytosanitary measures were obtained for the commodity associated with each pest. Table 4 outlines the commodity, the country of origin and the phytosanitary measures for the selected pests. As can be seen, this ranges from nothing required to post-harvest treatment before shipping and specialized packaging.

Table 4: Phytosanitary Treatment of Imported Commodities

Pest	Commodity	Source	Phytosanitary Measures
Ostrinta furnacalis	Ginger	Japan	None
Icerya seychellarum	Longan	China	Cold treatment, banned from Florida
Deudorix spp.	Pomegranate	Israel	Cold treatment
Anastrepha grandis	Watermelon	Brazil	Phytosanitary certificate showing area freedom from the pest, and packaging in insect-proof cartons.
Heliothis viriplaca	Tomato	France	Phytosanitary certificate showing area freedom from the pest or proof of greenhouse origin, and packaging in insect-proof cartons
Brevipalpus chilensis	Passionfruit	Chile	Treatment with soapy water and wax.

In general, there are only two ways that the measures in Table 4 can be reflected in the APHIS-PPQ qualitative risk assessment system, both of which are risk elements in likelihood of introduction. These are survival of post-harvest treatment and survival during shipment. In order to model the effect of phytosanitary requirements, the risk scores for the relevant elements were reduced to low (1) from their original score. The results of this process are shown in Figure 6.

The first observation is that 'medium risk' appears to be the acceptable level of protection. This is because in each case, the post-treatment PRP leaves the pest in the medium risk range. This result is simply a function of the limitations of the qualitative risk assessment system rather than an implicit risk stance of APHIS-PPQ. Since only one or two risk elements are modified by phytosanitary measures, and each of these risk elements is limited to three ordinal values, simple arithmetic means that a change in the ordinal value has only a relatively limited impact on the overall score. In this context, the 'low risk' category is not relevant to determining the acceptable level of protection.

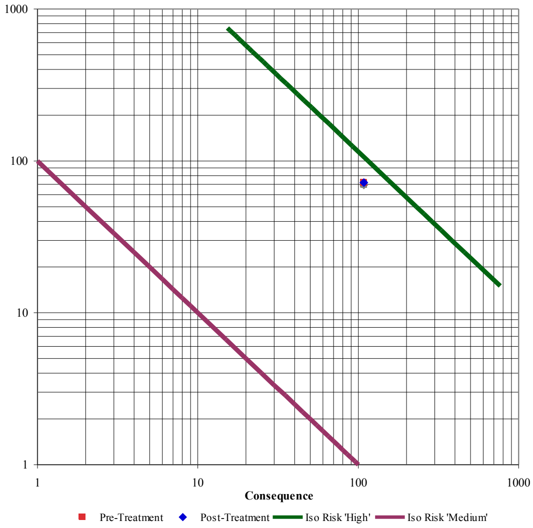
The second observation relates to conclusions about the relative consistency of phytosanitary measures for commodities based on their PRP. As can be seen in Figure 6, commodities with a high PRP were consistently reduced to a medium PRP as a result of the phytosanitary measure. In this context, high PRP commodities can be said to have been treated consistently in terms of the outcome of the phytosanitary measure. The picture is less clear for commodities with a medium PRP. As can be seen in Figure 6, in the case of ginger imported from Japan, the medium PRP rating resulted in no action being taken. This is consistent with how the commodities with a high PRP have been treated. However for pomegranate being imported from Israel, it appears to have been treated inconsistently given its relative PRP. Pomegranate is required to undergo a post-harvest treatment despite having only a medium PRP, and a PRP that is lower than ginger from Japan.

Conclusions

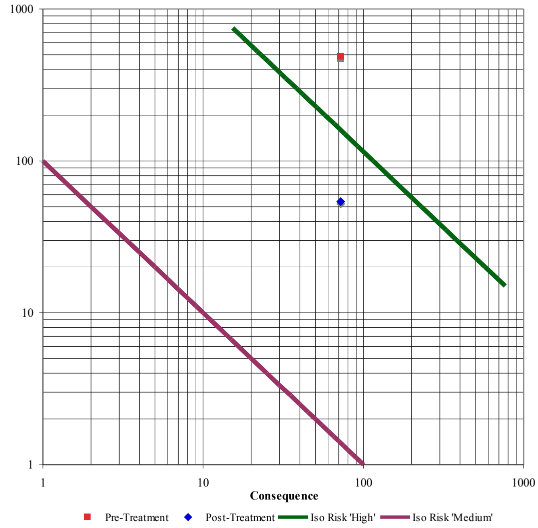
Under the SPS Agreement, countries are now required to assess both the likelihood of introduction and economic consequences of introduction when determining

Figure 6: Consistency of Medium PRP Phytosanitary requirements

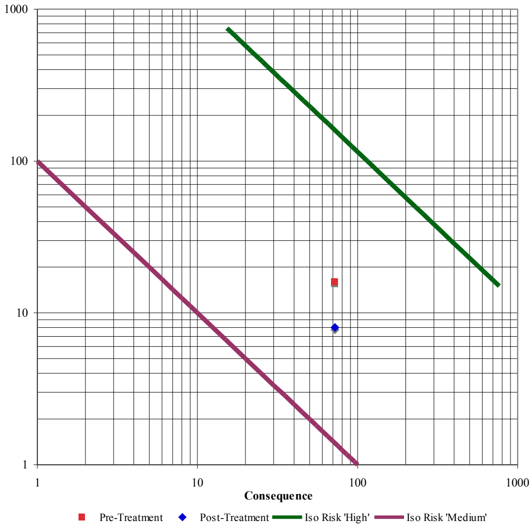
Ostrinta furnacalis - Ginger from Japan



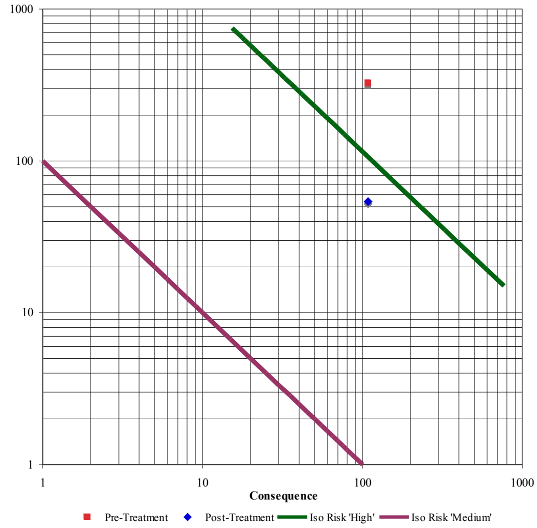
Anastrepha grandis - Watermelon from Brazil



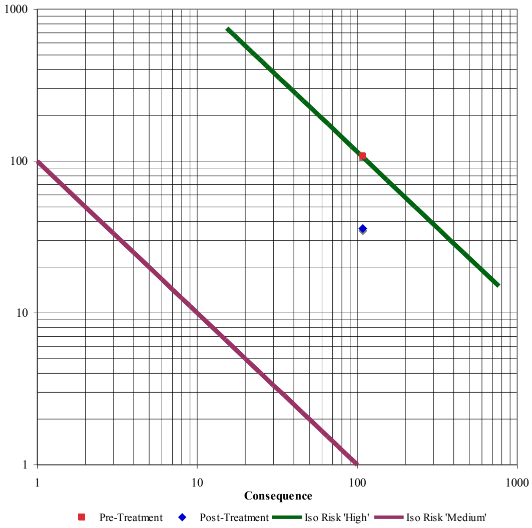
Deudorix spp. - Pomegranate from Israel



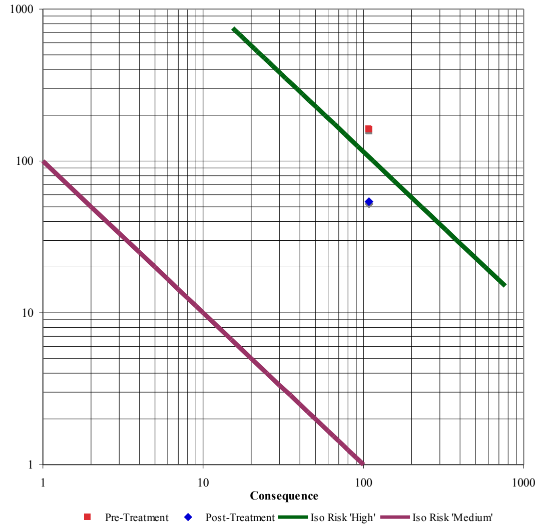
Heliothis viriplaca - Tomato from France



Icerya seychellarum - Longan from China



Brevipalpus chilensis - Passionfruit Chile



phytosanitary measures. The APHIS-PPQ has taken these requirements and combined them in a qualitative risk assessment system. This system is used to evaluate pest risk potential and recommend whether phytosanitary measures should be undertaken. The APHIS-PPQ pest risk assessment has been used since 1995 and has produced a large number of assessments to date.

Within SPS Agreement, is also an expectation that likelihood of introduction and economic consequences will be used in a way that ensures that decisions on phytosanitary measures are justifiable, in terms of meeting an overall acceptable level of risk and in terms of relative treatment of commodities from different countries. In this context, it is not clear that the APHIS-PPQ qualitative risk assessment system has brought the expected results. In order to evaluate how the qualitative risk assessment system might provide some measure of justifiable phytosanitary measures and whether it has resulted in consistent decisions this paper adapts the Iso-Risk approach to the qualitative data created by APHIS-PPQ risk assessments. The advantage of the Iso-Risk approach is that it provides a means for creating benchmarks and comparing quarantine treatments. This is then used to evaluate the consistency of phytosanitary measures arising from the APHIS-PPQ qualitative pest risk assessment system.

In general terms, the results show that the Iso-Risk framework can be used with qualitative data to evaluate pest risk. As shown in this paper, the Iso-Risk approach provides a mechanism for ensuring the even treatment of phytosanitary measures so that they do not become technical trade barriers. The approach also satisfies the need for transparent and measurable criteria for justifying decisions to trading partners. Using Iso-Risk, equivalent treatment requires that technical barriers or SPS have similar outcomes. This means that two exporters can be subjected to different quarantine requirements, but not violate WTO rules on equal treatment since the outcomes of the measures are similar. Justification of quarantine measures also becomes easier since decisions can be shown to be consistent within an overall domestic policy context.

In terms of consistency of phytosanitary decisions, although there is not an explicit link between phytosanitary measures and their effect on pest risk potential, the broad result of phytosanitary measures has been to make ‘medium risk’ the acceptable level of risk. For high risk pests, phytosanitary measures consistently reduce pest risk potential to medium risk. For medium risk pests however, it is not apparent that phytosanitary measures are justified, or that there is consistent treatment across pest that provide a medium level of risk.

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