BSES Limited

FINAL REPORT - SRDC PROJECT BSS256

REDUCING THE AUSTRALIAN SUGAR INDUSTRY'S GENETIC VULNERABILITY TO SUGARCANE SMUT

by

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SD07001

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SUMMARY

Sugarcane smut was recorded for the first time in Australia in July 1998 in the Ord River Irrigation Area (ORIA) and was identified in the Bundaberg/Isis, Central and Herbert regions of Queensland in 2006. Sugarcane smut can cause losses from 30-100% in susceptible varieties. The objective of this project was to rate Australian commercial varieties, advanced selections in the BSES/CSIRO selection programs, and parental clones for resistance to smut. The ratings will be used to provide smut-resistant varieties to the Australian sugar industry and to assist the breeding program to increase the frequency of smut-resistant genes in breeding populations.

This project continues the work commenced in the SRDC project BSS214 Screening of Australian Germplasm for Resistance to Sugarcane Smut. The smut-screening trials were conducted on Madura Island by the Indonesian Sugar Research Institute (ISRI) under contract to BSES.

Smut-resistance ratings for 598 clones including 43 commercial varieties were obtained in this project. Three trials were conducted with some clones being repeated in more than one trial to gain greater confidence in their ratings. A set of 10-12 standard varieties was included in each trial and the disease reaction of the standard varieties in the three trials was highly correlated with their long-term ratings. The frequency of clones with resistant-to-intermediate smut ratings in these three trials was 36% compared to 29% in the trials conducted in the previous project, BSS214. The two projects have now obtained ratings for 1504 clones. The smut-resistance ratings have been stored in BSES's plant improvement database, SPIDNet and have been extensively used in the BSES/CSIRO selection program when considering the release of varieties and in the breeding program when selecting crosses.

Sugarcane smut was identified for the first time in eastern Australia on 9 June 2006 in a field near Childers and was subsequently identified in the Central and Herbert regions. The smut-resistance ratings obtained from this and earlier SRDC-funded projects have been used extensively in developing response plans in all regions of the sugar industry on the east coast. The response plans focus on replacing susceptible varieties with resistant-to-intermediate varieties and would not have been possible without the knowledge of the smut resistance of varieties obtained in this and the earlier project. The ratings obtained from the Indonesian resistance screening trials have generally agreed with observations on the level of infection in the different varieties in the infested areas.

The smut-resistance ratings have also been used to select clones from the BSES/CSIRO plant improvement program for testing in the ORIA. The varieties Q171$^{(\phi)}$, Q177$^{(\phi)}$ and Q208$^{(\phi)}$, which were identified as resistant to smut in this project, were released to growers in the ORIA in 2006.

In anticipation of the arrival of smut, and preceding commencement of this project, BSES had in place a strategy of attempting to make 50% of parental crosses in the cross-pollination program of a resistant rating, i.e., a mid-parent rating of < 6.5 on a 1-9 scale where 1 is highly resistant and 9 is highly susceptible. In 2005, this objective was refined so that a target of 25% of crosses made had to be resistant, i.e., a mid-parent value <3.5 and the remaining 25% of crosses had to be of an intermediate rating, i.e., ≥ 3.5 and < 6.5. These objectives have largely been met, or exceeded, in the cross-pollination activities as

a whole, and in crosses made for the specific programs. In selection stages flowing from these crosses, the objective was to have 50% of clones in each of the three selection stages, where possible, originating from the resistant crosses. After the arrival of smut in eastern Australia in June 2006, the strategy for breeding for smut resistance has been reviewed again. Ultimately, we desire to be in a situation where ≤ 20% of clones in the selection program are susceptible. To meet this objective while maintaining advances in selection for improved yield will initially require an expansion of the size of the selection programs.

BSES has commenced smut-resistance screening trials at a site near Bundaberg. The experience obtained in this and the early project in Indonesia has allowed these trials to be established quickly and efficiently. The advantage of commencing screening for smut resistance in Bundaberg is that large numbers of clones can be screened, greatly increasing the efficiency of the selection program. The clones can be screened without the restrictions imposed by quarantine requirements for shipping clones to Indonesia or the ORIA.

The smut-resistance ratings of commercial varieties have been widely distributed to growers in smut response plans, magazine articles, media releases, variety guides and newsletters.

1.0 BACKGROUND

Sugarcane smut was first recorded in South Africa in 1877, but has since been recorded in all commercial sugarcane industries except Fiji and Papua New Guinea (Comstock 2000). The disease is caused by the fungus, *Ustilago scitaminea* H. and P. Sydow. During the 1970s and 1980s, smut spread to Hawaii, the Caribbean, South, Central and North America and was reported for the first time in 50 years in Indonesia. The first report of smut in Australia occurred in the Ord River Irrigation Area (ORIA) in Western Australia in 1998 (Riley *et al.* 1999). The disease was identified in the Bundaberg/Isis region of Queensland in June 2006 and has subsequently been found in the Central and Herbert regions. The disease can cause yield losses of 30-100% in susceptible varieties and can make ratoon crops unprofitable. Smut can be successfully controlled by resistant varieties, but the loss of productive susceptible varieties has caused major disruptions to sugar industries around the world (Lee-Lovick 1978). Previous studies have shown that narrow-sense heritability for smut resistance is moderate to high (Walker 1980; Wu *et al.* 1988; Chao *et al.* 1990).

Sugarcane smut infects plants when spores come in contact with buds on standing stalks or germinating buds in the soil (Comstock 2000). The fungus penetrates the buds and the fungal hyphae grow in close association with the plants' meristems. Eventually the fungus causes the plant to form a modified floral structure within which the fungus produces masses of brown/black teliospores (Figure 1). The sorus, or fruiting structure of the fungus, is known as a whip and can be from a few centimetres to 1.5 m long. The spores initially are enclosed in a thin silvery membrane, which ruptures and releases the spores to be spread by the wind. Infected plants are generally stunted and may produce many thin, grassy tillers.

Figure 1 Typical smut whip on a thin grassy shoot

In the ORIA in Western Australia, surveys initially identified relatively low level infections in crops concentrated at the northern end of the production area. Within 12 months of being discovered, the disease had spread throughout the ORIA production area and many fields of

susceptible varieties were heavily infested. Susceptible varieties (NCo310 and Q117) made up 30% of the crop when the disease was discovered and would have suffered complete crop loss after first or second ratoon if they had not been replaced.

In June 2006, sugarcane smut was identified in the Isis mill area near Childers. Detailed surveys conducted throughout the Bundaberg/Isis region found infection on more than 70 farms and 180 fields widely scattered throughout the region. On 7 November 2006 the disease was found on a farm in Mackay and on 16 November it was found at Flaggy Rock, 35 km south of Sarina. Twelve infected farms have been identified at Mackay and surveys are continuing. Smut was found in the Herbert River district on 6 December 2006 and 22 farms have been found to be infested in this district. At the time of writing, no disease has been found in the Far North (Tully to Mossman), Burdekin, Maryborough, Rocky Point or New South Wales regions.

After the disease was identified in the Bundaberg/Isis region of Queensland, a national management committee was convened by the Office of the Chief Plant Protection Officer that involved Plant Health Australia, Federal and State departments and industry bodies. After the findings in Mackay and the Herbert, it was decided that the disease was established in Queensland and that eradication or containment were not possible. The Queensland Department of Primary Industries and Fisheries, sugar industry groups, and BSES are developing response plans to ensure that losses from the disease are minimised. The key activity in all the response plans is to replace susceptible varieties with resistant varieties and to minimise the economic impact of the disease.

DNA fingerprinting of smut isolates (funded by BSES, SRDC, QDPI&F and the CRC for Tropical Plant Protection) has shown that there is no significant difference between the smut in Bundaberg/Isis, Indonesia, and the ORIA. There has been good agreement between smut ratings for clones in the ORIA and in Indonesia. The ratings obtained in Indonesia and the ORIA are consistent with initial observations on the field reaction of most varieties in the Herbert, Central, and Bundaberg/Isis regions.

A key component of the response plans is to accelerate the delivery to industry of high-yielding, smut-resistant varieties. Smut-resistant varieties identified in this project and the previous project, BSS214, have played a key role in the response to the smut incursion. BSES approved a large project to complement the SRDC-funded projects in May 2006. After the finding of smut in Bundaberg/Isis, the program was redesigned and screening for smut resistance of advanced clones from all regions in eastern Australia and 50,000 seedlings commenced in Bundaberg. This program will build on the platform laid by the SRDC-funded projects and will provide industry with additional smut-resistant varieties in coming years.

The Queensland Government commissioned an economic review of the impact of the incursion of sugarcane smut in Queensland - known as the Watson review. This review found that the sugarcane smut incursion will cost the Herbert, Burdekin, Central and Bundaberg/Isis regions between $357m and $441m net present value over seven years from 2007 to 2014. This analysis included direct losses from the disease and losses from the need to plant lower yielding smut-resistant varieties in some districts. This analysis assumed that there would only be limited new plantings of susceptible varieties. Without availability of resistant varieties identified by this and the earlier project the losses from the incursion would have been significantly higher.

In project BSS214, smut-resistance ratings for 906 clones including over 100 commercial varieties were obtained from trials in Indonesia. The project found that the frequency of smut reaction of Australian clones was skewed strongly towards susceptibility, with 71% of clones being rated susceptible, 18% intermediate and 11% resistant. The aim of this project was to build on the results of the earlier project and to breed high yielding smut-resistant varieties for the Australian sugar industry.

2.0 OBJECTIVES

Building resistance to sugarcane smut in Australian germplasm is a very high priority in the BSES/CSIRO Joint Venture's plant improvement program.

The key objective of this project was to breed smut-resistant varieties for the Australian sugar industry that have high yield potential and are adapted to the various environments within the industry. This was to be achieved by:

1. Making crosses between parental clones that have smut resistance.
2. Screening advanced selections for resistance to sugarcane smut in Indonesia.
3. Confirming the smut resistance of imported varieties and using smut-resistant varieties as parents.
4. Using information from the BSES Limited's Plant Improvement program to select smut-resistant clones with acceptable yield, agronomic characteristics, and pest and disease resistance for each region.
5. Releasing smut-resistant varieties and advising cane growers of the availability of smut-resistant varieties.

All of these objectives have been met, as detailed below.

3.0 OBJECTIVE 1 - MAKING CROSSES BETWEEN PARENTAL CLONES THAT HAVE SMUT RESISTANCE

The strategy for breeding for smut resistance was developed and refined at several meetings held in the period BSS256 operated, from 1 July 2002 to 31 December 2006. These meetings involved the majority of scientists in the Crop Improvement BSES/CSIRO Joint Venture and the Plant Protection group of BSES. The existing strategy of attempting to make 50% of smut resistant crosses was endorsed in the July 2002 meeting. Resistant crosses were defined as those ones having a mid-parent rating < 6.5, i.e., R x R, R x I, R x S, and I x S, where R = 2, I = 5, S = 8, on the ISSCT rating scale of 1 = highly resistant to 9 = highly susceptible. The least acceptable cross would be an I x S = (5 + 8)/2 = 6.5. Parents with an unknown smut rating were assigned a 7.0 rating (population average). The strategy also required that 50% of entries in each of the three selection stages should be from resistant crosses. In May 2005, at a further meeting, the strategy was refined so that the objective was to make 25% of crosses resistant, i.e., with a mid-parent rating, < 3.5 and 25% of crosses of intermediate rating, i.e., ≥ 3.5 and < 6.5.

The strategy was strengthen further by planting additional quantities of available smut-resistant parents in parental blocks for use in cross pollination and the adoption of a new bonus system in the BSES computer crossing program to promote smut resistant crosses where possible. In 2006, after the finding of smut in Childers, a decision was taken to optimise the use of potential crosses in the two BSES photoperiod facilities by combining the two facilities. Photoperiod facility A contained smut resistant parents and photoperiod facility B contained a selected population of high-sucrose parents, but few of these (6/64) possessed acceptable smut resistance. Rather than waste initiated panicles, crosses were made between the smut-resistant parents in PF (A) and the high-sucrose parents in PF (B), as long as the mid-parent average of the cross was ≤ 6.0.

A continuing problem is that the breeding values of the majority of available smut-resistant parents are low, and this imposes a limit on the progress for breeding for yield and smut resistance that can be made using these parents. In addition, the number of smut-resistant parents available in the parental pool is relatively small. A majority have been initiated several times in PF (B). More smut-resistant parents are required for use in crossing, but currently these are not readily available.

The progress made from implementation of the smut breeding strategy can be clearly demonstrated (Figure 2). In the period 2000-2006, the proportion of crosses classified resistant to smut increased from zero to 21% of crosses made. The proportion of intermediate crosses also increased from 20 to 43%, and susceptible crosses decreased from 78 to 36%.

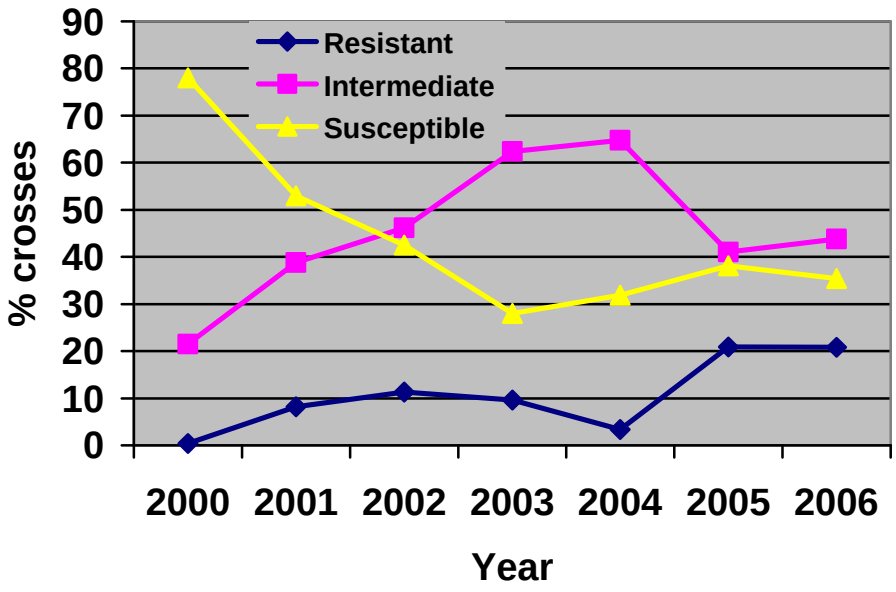

Figure 2 Proportion of crosses in different resistance classes from 2000-2006

The position regarding crosses made in the most recent cross-pollination season (2006) shows that overall, we fell just short of the new target of 25% resistant crosses, with 20.7%, and we exceeded the target for intermediate crosses, with 40.5%, when the best estimate of a cross' resistance was used (Table 1). When only crosses for which the ratings were known for both parents were considered, the targets were considerably exceeded. This was an

unexpected result for the first year of the new targets and is due largely to the new smut-resistant bonus that was given to potential crosses in the BSES crossing database and the planting of extra plots of smut-resistant parents. The success of using PF (A) in making many highly resistant crosses also assisted meeting the targets.

The smut resistance of crosses made for the five regional programs in the 2006 cross-pollination season was analysed to see that targets were being met for each region (Table 2). The Southern region was close to or exceeded the targets for resistant and intermediate crosses. The target for intermediate crosses was exceeded in all but the northern program, but these programs fell short of the target for resistant crosses. The crosses made in the photoperiod facilities will be distributed between the regions and will increase the proportion of resistant and intermediate crosses in the regions. Overall, the proportion of resistant crosses was only slightly below the target of 25% of crosses and the proportion of intermediate crosses was well above the target.

Setting a target of 50% crosses with mid-parent rating less than 6.5 was considered to be a reasonable compromise when smut was not present in the east-coast industry. However, since the discovery of smut on the east coast, the whole strategy for breeding for smut resistance while maintaining advances for productivity must be reassessed. Currently, as indicated earlier, we have a shortage of smut-resistant parents with high breeding value. The challenge is for the breeding team to produce smut-resistant varieties with productivity as high as, if not better than, varieties in use prior to the smut incursion. BSES/CSIRO has decided on a dual approach in the short term to breed high yielding smut-resistant varieties. Smut-resistant crosses will be made and the clones from these crosses will enter directly into the normal selection program. High breeding value crosses that are susceptible to smut will be made and 50,000 progeny from these crosses will be screened for smut resistance and 2500 smut-resistant clones will be selected for planting in stage 2 trials in addition to the 2500 clones selected from the routine selection program. Overseas research has shown that even in these smut-susceptible crosses a small percentage of the progeny will be resistant to smut. This program will require a large increase in the BSES/CSIRO selection and breeding programs. In the longer term, as the program adapts to the imposition of smut as an important selection criterion, parental combinations that are smut resistant and that produce clones of high productivity will be identified.

Table 1 **Average smut rating of crosses made in the Meringa core program, Meringa photoperiod facilities, PF(A)) and PF(B)), and Bundaberg photoperiod facility in 2005. The best estimate refers to ratings using the best available estimate of the parents smut resistance including actual ratings, ratings of grandparents or, if no information was available for one parent, a default value of rating 7. The actual classification refers to where ratings are available for both parents. If no information was available for either parent the cross was classified as unknown.**

Source	Mid-parent rating	Resistance class	Best estimate		Actual	
			No.	%	No.	%
Meringa (Core)	Resistant	1-3	228	16.5	200	36.6
	Intermediate	4-6	609	44.0	231	42.3
	Susceptible	7-9	528	38.2	115	21.1
	Unknown		19	1.4		
	Total		1384		546	
Meringa (PF(A))	Resistant	1-3	271	60.4	254	66.0
	Intermediate	4-6	152	33.9	125	32.5
	Susceptible	7-9	22	4.9	6	1.6
	Unknown		4	0.9		
	Total		449		385	
Meringa (PF(B))	Resistant	1-3	0	0	0	0
	Intermediate	4-6	124	27.0	5	45.5
	Susceptible	7-9	333	72.4	6	54.5
	Unknown		3	0.7		
	Total		460		11	
Bundaberg (PF)	Resistant	1-3	8	5.2	1	25.0
	Intermediate	4-6	107	69.0	1	25.0
	Susceptible	7-9	40	25.8	2	50.0
	Unknown		0	0		
	Total		155		4	
Total	Resistant	1-3	507	20.7	455	48.1
	Intermediate	4-6	992	40.5	362	38.3
	Susceptible	7-9	923	37.7	129	13.6
	Unknown		26	1.1		
	Total		2448		946	

Table 2 Average smut rating of crosses made for regional breeding programs, introgression program and photoperiod facilities in 2006.

Region	Mid-parent rating	Resistance class	No.	%
North	Resistant	1-3	14	4.0
	Intermediate	4-6	82	23.4
	Susceptible	7-9	255	72.6
	Total		351	
Burdekin	Resistant	1-3	50	18.7
	Intermediate	4-6	111	41.4
	Susceptible	7-9	107	39.9
	Total		268	
Central	Resistant	1-3	32	12.8
	Intermediate	4-6	76	30.4
	Susceptible	7-9	142	56.8
	Total		250	
Southern	Resistant	1-3	50	22.3
	Intermediate	4-6	85	37.9
	Susceptible	7-9	89	39.7
	Total		524	
Photoperiod facilities	Resistant	1-3	239	32.1
	Intermediate	4-6	447	60.0
	Susceptible	7-9	59	7.9
	Total			
Introgression	Resistant	1-3	2	7.7
	Intermediate	4-6	16	61.5
	Susceptible	7-9	5	30.8
	Total		26	
All	Resistant	1-3	387	20.8
	Intermediate	4-6	817	43.9
	Susceptible	7-9	657	35.3
	Total		1861	

4.0 OBJECTIVE 2 - SCREENING ADVANCED SELECTIONS FOR RESISTANCE TO SUGARCANE SMUT IN INDONESIA.

4.1 Introduction

This project aimed to conduct three smut-resistance screening trials in Indonesia each with 250 clones. The trials would include clones from advanced stages of the BSES/CSIRO selection program, commercial varieties, parent clones and varieties imported by BSES from overseas.

4.2 Materials and methods

4.2.1 Plant material and trial design

In 2002, BSES negotiated a contract with the Indonesian Sugar Research Institute (ISRI) to screen three batches of 250 Australian clones for resistance to sugarcane smut. The trials were given the code numbers 7-9 to continue the numbering system commenced in project BSS214. Clones from Fiji leaf gall-infested regions in Australia were quarantined in BSES's quarantine facilities in Brisbane for 1 year and screened for Fiji leaf gall with a PCR-DNA assay before dispatch to Indonesia. Clones from Fiji leaf gall-free regions were dispatched directly to Indonesia from BSES/CSIRO approved propagation plots. Three, 300-400 mm stalk pieces were shipped to Indonesia and were planted in the ISRI quarantine plot on Puteran Island (Figure 3). The clones were pre-germinated and planted into 3 m, single-row plots. The cane was regularly inspected for disease for 12 months. After the 1-year quarantine period, that also acted as a propagation phase, the clones were planted into the smut resistance trial at a site near Sumanep on Madura Island (Figure 3). This protocol was approved by the Indonesian Government quarantine authority.

Figure 3 Map of East Java, Madura, and Puteran Islands

Trials 7-9 consisted of four replicates in a randomized complete block design. Each plot consisted of 10 two-eye setts planted in a 5 m single-row plot. Trial 7 (213 clones) was planted on 14-17 October 2003, trial 8 (274 clones) on 26-29 October 2004 and trial 9 (255 clones) on 22-25 November 2005. Plant crops were grown for 6 months and then ratooned, these being grown for a further 6 months.

4.2.2 Inoculation

Smut spores were collected for the trials from the Jatitujuh sugarcane plantation, Ceribon (Cheribon) West Java, which has a high incidence of smut infection in commercial fields. Whips were collected from the field and the spores were removed by scraping the whips with a blunt knife. The resulting material was sieved and the spores dried in the sun. The spore viability was checked by germinating spores on water agar at 28°C overnight. Spores were used at 1 g/L of dipping solution to give a concentration of 5 x 10^6 spores/mL. Two-eye setts were dipped in the spore suspension for 10 min and then covered by plastic fertiliser bags overnight to maintain high humidity to encourage spore germination. The inoculated setts were planted in the field and covered with moist soil.

4.2.3 Rating clones

The number of stools per plot was recorded at monthly intervals after planting and the number of stools with smut whips was recorded from 2 months after planting. Stools were defined as the plant developing from a single bud. The trials were ratooned at 6 months and rating was continued monthly in the first-ratoon crops.

4.2.4 Statistical analyses

Analyses of variance were conducted on the percent-infected plants for all trials. Standard clones/varieties were included in all trials and the test clones were rated relative to the standard clones. The ISSCT standard rating system was used with a rating scale of 1 = highly resistant to 9 = highly susceptible. The standard ratings were based on the long-term reaction of standards in all trials. Ratings for the test clones were calculated from the regression equation for the log transformed percent infection for the standards (X) and their standard ratings ($\hat{Y}$). The standards included in the trials and the mean percent infection and ratings are shown in Table 3.

Table 3 Standard varieties, percent infection in trials 7-9, mean percent infection for all trials (1-9) and ratings based on the mean of all trials.

Clone	% infected plants				Rating
	Trial			Mean trials	
	7	8	9	1-9	
Q99	10.5			6.1	1
Q171[b]	10.5	26.2	11.4	10.1	1
PS79-82	16.0	11.2	11.7	10.7	1
PS87-10266	16.9	20.9	21.3	16.9	4
Q124	27.7	16.6		20.9	4
Q155	19.5	21.9	17.0	21.6	4
M442-51	37.9	36.7	26.7	36.6	7
PS80-442	16.6		24.0	36.8	7
PS84-16029	47.9	47.8	64.8	39.6	7
Q170[b]	48.3	57.1	42.2	40.8	7
NCo310	41.8	60.0	50.7	46.2	8
Q117	74.5	67.9	59.5	67.7	9

4.3 Results

The percent smut-infected plants increased constantly until harvest of the plant crop in all three trials (Figure 4). In the young ratoon crop, the incidence of disease was lower than at the end of the plant crop, but it quickly increased in the ratoon crop and, at the end of the ratoon crop, disease levels were more than double that recorded in the plant crop. ,The pattern of disease development was similar in the three trials and was similar to the mean for trials 1-9.

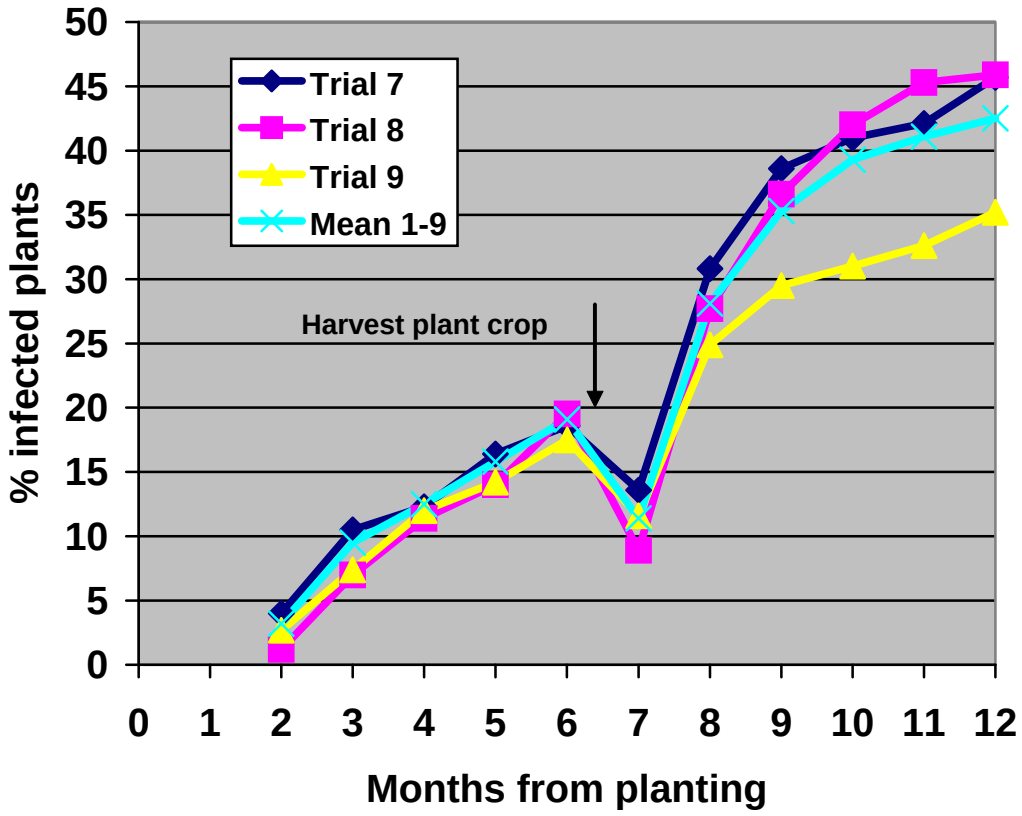

Figure 4 Disease development in trials 7-9 (mean of all clones) and the mean for trials 1-9

The correlation of the percent-infected plants of the standard varieties in trials 7-9 relative to the long-term mean from all trials is shown in Table 4 and the percent infection for the standard in the three trials is shown in Table 3. The correlations were all highly significant.

Table 4 Correlation coefficients for the mean percent infection of standard varieties in trials 7-9.

Trial	Correlation coefficient (*r*)	No. varieties	P
7	0.82	12	<0.01
8	0.87	10	<0.01
9	0.91	10	<0.01

We screened 598 clones were screened for smut resistance in trials 7-9. Some clones were repeated to provide a greater confidence in the rating. The percent infection at the end of the plant and ratoon crops and the ratings assigned to clones in trials 7-9 are shown in Appendix 1. The average ratings of the 598 clones are shown in Appendix 2.

The frequency distribution for the nine rating classes is shown in Figure 5. There were 11.5% resistant (rating 1-3), 24.6% intermediate (rating 4-6) and 63.9% susceptible clones (rating 7-9). The proportion of resistant-to-intermediate clones in these trials was slightly higher than in trials 1-6 in project BSS214 (36% resistant to intermediate compared to 29%, respectively).

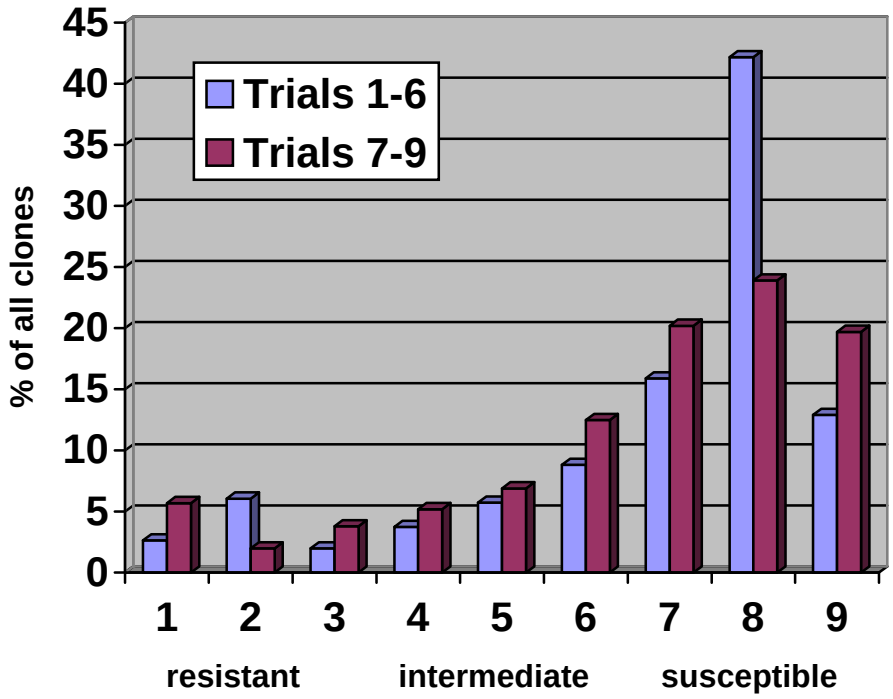

Figure 5 Frequency distribution of smut resistance ratings (R ≤ 3; I = > 3.0 < 7.0; and S ≥ 7.0) of clones in trials 1-6 (project BSS214, 906 clones) and in trials 7-9 (project BSS256, 598 clones)

4.4 Discussion

The project aimed to conduct three smut-resistance screening trials each with 250 clones. Three trials were conducted with a total number of entries of 742. Some clones were repeated in more than one trial to gain greater confidence in their ratings and the total number of clones for which ratings were obtained was 598. The results for the trials and the ratings of clones are stored in the BSES's Sugarcane Plant Improvement Database (SPIDNet). Growers have been advised of the ratings of commercial varieties in smut response plans, magazine articles, field days and BSES Limited's variety guides. The data from this project and the previous project (BSS214) have played a key role in the response to the incursion of sugarcane smut in eastern Queensland and have provided smut-resistant clones for assessment in the ORIA. BSES also has used the data extensively in selecting parent clones in the breeding program.

The disease development was very similar in all trials and the reaction of the set of standard varieties was highly correlated with the long-term reaction of these varieties. This gives us confidence that the ratings given to the test clones are reliable.

Ratings obtained from the resistance-screening trials in this project generally have agreed with observations in the infested areas in Queensland. Some varieties have less disease in the field than would be expected from their ratings from the Indonesian trials, but this may be due to the uneven distribution of the disease at this early stage of the epidemic. In the ORIA, the ratings obtained from the Indonesian trials have agreed well with the field reaction of varieties.

We found that 64% of the clones tested were susceptible to smut. This was slightly lower than in the previous six trials. The BSES/CSIRO breeding and selection programs face a major challenge to reduce the proportion of susceptible clones while maintaining advances in productivity.

5.0 OBJECTIVE 3 CONFIRMING THE SMUT RESISTANCE OF IMPORTED VARIETIES AND USING SMUT-RESISTANT VARIETIES AS PARENTS

BSES has emphasized the introduction of smut-resistant clones and varieties from overseas sugarcane breeding programs since 1999, when re-introduction through BSES Indooroopilly recommenced after an interruption of several years. In the period from 1999 to 2006, 321 clones and varieties were introduced, an annual average of 40. The clones must spend at least 2 years in quarantine and require a period of multiplication for a further year before there is sufficient planting material for inclusion in smut-screening or breeding plots. The most efficient method of screening these clones for smut resistance was to conduct the screening in the ORIA. BSES in cooperation with the Department of Agriculture Western Australia and SRDC project CTA043 has screened 247 overseas clones for smut resistance in the ORIA since 1999. Appendix 3 lists the smut ratings of the overseas clones rated for smut resistance in the ORIA. 44% of the clones were resistant, 24% intermediate and 32% susceptible.

The proportion of resistant varieties in the overseas clones is much higher than in the Australian clones, but there were still a third of the clones that were rated susceptible. The reason why the overseas clones still included a significant number of smut-susceptible clones could be due to differences in the screening techniques and the environments under which the testing was conducted. We recommend that all overseas clones be screened for smut resistance in Australia to confirm that they are resistant under Australian conditions.

6.0 OBJECTIVES 4 AND 5 - USING INFORMATION FROM THE BSES'S PLANT IMPROVEMENT PROGRAM TO SELECT SMUT-RESISTANT CLONES WITH ACCEPTABLE YIELD, AGRONOMIC CHARACTERISTICS, AND PEST AND DISEASE RESISTANCE FOR EACH REGION AND RELEASING SMUT-RESISTANT VARIETIES AND ADVISING CANE GROWERS OF THE AVAILABILITY OF SMUT-RESISTANT VARIETIES

In response to the smut incursion in Queensland, BSES, and industry groups have worked together to develop a plan for variety replacement in each region. These plans have used the smut resistance ratings obtained from this and the earlier projects BSS214 and CTA043. A summary of the strategy of these plans is described by Hogarth (2006). A list of the smut intermediate and resistant commercial varieties identified by this and the earlier projects that will form the basis of the Australian sugar industry in the next few years is shown in Table 5.

Table 5 Commercial varieties that are rated intermediate (I = 3-6) or resistant (R = 1-3) to smut.

Smut rating	
Intermediate	**Resistant**
Q119	BN73-3416
Q135	BN81-1394
Q155	CASSIUS
Q172[A]	CP74-2005
Q183[A]	Florida
Q190[A]	KQ228[A]
Q203[A]	Q133
Q208[A]	Q146
Q210[A]	Q149
Q213[A]	Q151
Q219[A]	Q171[A]
Q226[A]	Q177[A]
Q227[A]	Q182[A]
Q96	Q199[A]
QC75-326	Q200[A]
RB72-454	Q212[A]
SP79-2313	Q99
TS65-28	QS85-7325
	QS94-2329

The percentage of the crop (2005) harvested from smut-resistant, intermediate and susceptible varieties is shown in Figure 6. The Herbert region has the highest proportion of smut susceptible varieties with close to 90% of the crop produced by susceptible varieties. The North, Central and Southern regions have more than 70% susceptible varieties.

The situation in the North was rapidly changing even before smut was identified in Queensland because the smut-resistant variety Q200$^{\Phi}$ was being planted widely because of its excellent cane and sucrose yield. This change will be accelerated by the finding of smut in Queensland.

The Burdekin is in a relatively good position with high-yielding smut resistant-to-intermediate varieties accounting for 60% of the crop. Another high-yielding smut-resistant variety, KQ228$^{\Phi}$, was released in the Burdekin in 2006.

In the Central region, the high-yielding smut-intermediate variety Q208$^{\Phi}$ was released in 2005 and almost all growers have a plant source of this variety for further planting in 2007. The varieties Q200$^{\Phi}$ and KQ228$^{\Phi}$ were propagated in 2006 for distribution to growers in the Central region in 2007. The intermediate varieties Q135 and Q190$^{\Phi}$ have been grown widely in the Central region for many years and these varieties should have sufficient resistance to allow them to be grown in the early stages of the epidemic.

After the finding of smut in Queensland, BSES, in cooperation with regional productivity and industry groups, arranged for planting material of the best varieties with resistant-to-intermediate smut reaction to be propagated in all centres. In the Bundaberg/Isis region over 4000 t of three smut resistant-to-intermediate varieties (Q177$^{\Phi}$, Q200$^{\Phi}$ and Q208$^{\Phi}$) were transported from the Herbert, Burdekin and Central regions to supplement existing resistant-to-intermediate varieties such as Q151 and Q155. This will allow Bundaberg/Isis to plant only resistant-to-intermediate varieties in spring 2007. In addition, BSES has mass propagated the smut-resistant clone QS94-2329 by one-eye setts and tissue culture for release in Bundaberg/Isis in 2007. This clone had been selected for release because of its high yield and smut resistance but its release was accelerated after the finding of smut in Bundaberg/Isis.

The New South Wales industry has several productive varieties with a resistant-to-intermediate smut rating, including BN81-1394, Q151, Q155, Q203$^{\Phi}$ and Q212$^{\Phi}$. Susceptible varieties account for less than 50% of the crop in NSW. Plant sources of Q200$^{\Phi}$ and Q208$^{\Phi}$ have been established in NSW for distribution to growers in 2007. We predict that the environmental conditions in NSW will be less favourable for smut disease development and varieties with less resistance to smut may be acceptable in this region.

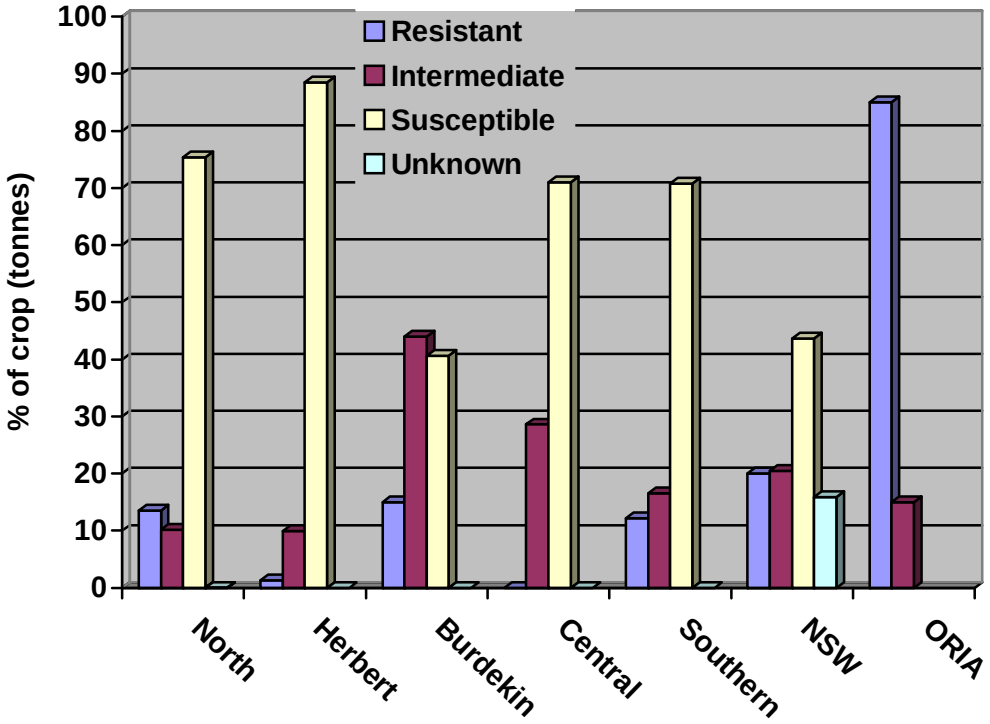

Figure 6 The percentage of the 2005 crop harvested from smut resistant, intermediate and susceptible varieties in each region of Australia

7.0 INTELLECTUAL PROPERTY

Most of the sugarcane varieties and clones used in this project are the property of BSES. Many of the commercial varieties are protected by PBR rights under Australian legislation.

Use of the smut-resistance ratings in this report in any other research project should acknowledge the source of the ratings and the authors of this report.

8.0 ENVIRONMENTAL AND SOCIAL IMPACTS

This project will have significant social benefits to regional communities in eastern Australia that rely on the sugar industry. The finding of sugarcane smut in Queensland in 2006 may have resulted in a dramatic reduction in yields and major disruption to regional communities. The results of this project will alleviate these losses and their social impacts.

An orderly transition from smut-susceptible to smut-resistant varieties will reduce the need for premature plough out of infected fields and will, therefore, benefit the environment by reducing the soil degradation associated with increased cultivation. Smut incursion response plans have actively promoted the use of alternative crops in the fallow after plough out of susceptible varieties.

9.0 OUTPUTS

The major output from this project is the smut-resistance ratings that have been entered into the BSES's Sugarcane Plant Improvement Database (SPIDNet). These data are available to all BSES staff and the BSES/CSIRO joint venture. The smut-resistance ratings of commercial varieties have played a key role in the response to the sugarcane smut incursion in Queensland. Growers have been advised of these ratings in the *BSES Bulletin*, newsletters, variety guides, and numerous communications from BSES, productivity groups, and industry organisations. The data have been used extensively for decisions on selection of clones in the BSES/CSIRO selection program and for making crosses in the breeding program. Extension and variety officers have used the data when preparing newsletters, extension material and variety guides and when providing advice to growers. BSES/CSIRO research staff has used the data in research on DNA markers for smut resistance. The ratings also are used when selecting clones for dispatch to the ORIA and are used to support the data collected in the ORIA. The data contained in SPIDNet is a valuable resource that will assist the Australian sugar industry manage the sugarcane smut epidemic.

Publications and extension material produced from the project are listed below.

Hogarth, D.M. (2006) Development of susceptible variety replacement plans. *BSES Bulletin* 11:21-23.

BSES Bulletin issue 11 (2006) Special issue on sugarcane smut.

Willcox, T. and Croft, B. J. (2004). Quantifying risk of loss from sugarcane diseases and other variety related causes. *Proceedings of the Australian Society of Sugar Cane Technologists* 26: 10 (CD-ROM).

10.0 OUTCOMES

The main outcome from this project has been information on smut resistance of current commercial varieties and clones and varieties in the BSES/CSIRO breeding and selection programs. This information is being used by growers when developing plans to replace susceptible varieties with resistant-to-intermediate varieties in response to the smut incursion in Queensland. BSES is using the information extensively in decisions on advancement of varieties in the selection program and on crosses in the breeding program. The smut-resistant varieties identified by the project will reduce the losses suffered from sugarcane smut. The Watson review estimated that the sugarcane smut incursion in Queensland will cost the Herbert, Burdekin, Central and Bundaberg/Isis regions between $357m and $441m net present value over 7 years from 2007 to 2014. These losses would have been much greater if smut-resistant varieties identified by this project were not available.

The information provided by this project has been used to select varieties and clones for export to the ORIA. The smut-resistant varieties Q171$^{\Phi}$, Q177$^{\Phi}$ and Q208$^{\Phi}$ were released to ORIA growers in 2006. The provision of smut-resistant varieties to the ORIA will improve the productivity of the district and will allow growers to plant a wider range of varieties. This will reduce the over-reliance on Q99, which currently makes up greater than 85% of the crop.

The experience gained by BSES staff in conducting smut resistance screening trials has allowed BSES/CSIRO to establish smut-screening trials in Bundaberg. These trials will greatly increase the efficiency of screening for smut resistance in the future.

The excellent cooperation with the ISRI has provided the information on smut resistance of Australian clones.

11.0 RECOMMENDATIONS

1. Develop a sugarcane smut-screening program in Queensland and integrate this program into the BSES/CSIRO breeding and selection programs.
2. Accelerate the rate of progress for breeding for smut resistance by rating clones earlier in the selection program thereby reducing the generation time for recurrent selection.
3. Screen original seedlings from crosses between high-value parents and select any resistant progeny to combine the genes for high yield and smut resistance.
4. Conduct field surveys and experiments to determine the rate of natural infection in commercial varieties to ensure that the resistance ratings obtained from this project are correlated with field reaction under the various environmental conditions in the Australian sugar industry.
5. Continue research into alternative methods of screening clones for smut resistance such as DNA markers.
6. Develop extension and communication programs to assist growers to change to smut-resistant varieties while maintaining productivity and managing risks from other pests and diseases.

12.0 EXTENSION MESSAGE

Sugarcane smut has been found in the Bundaberg/Isis, Central and Herbert regions of Queensland and is likely to spread to all regions in Queensland and NSW within the next 2-3 years. In all overseas countries, sugarcane smut is controlled with resistant varieties. Smut is a devastating disease that can cause complete crop loss in susceptible varieties. The disease causes severe stunting, thin grassy shoots and a whip-like structure is formed from the heart of the stalk. The smut whip can produce 100 million spores per day for 2-3 months and the spores are ideally suited to wind dispersal.

BSES, with funding from SRDC and QDPI&F has rated all Australian varieties for resistance to smut. Growers can obtain these ratings from any BSES office. Since 1998, this program has rated more than 1,500 clones. BSES/CSIRO has released a number of high yielding smut-resistant varieties, including Q200$^{\phi}$, Q208$^{\phi}$ and KQ228$^{\phi}$ that were identified by this project and has been actively breeding for smut resistance. These varieties and other smut-resistant varieties identified by this program will allow the Australian sugar industry to reduce the losses from the disease. BSES/CSIRO has increased the size of their breeding program to ensure that more smut-resistant varieties with high yield potential will be provided to the industry in the future.

No one can be sure of the rate of spread of smut within a region or between regions, but we recommend that all growers develop a plan for preparing for smut in their region. Growers who already have smut on their farm should be developing a plan on how they can move to smut-resistant varieties while minimising economic losses.

In the three regions in which smut has already been found, the disease is scattered widely, but the number of infected farms and the level of infection is still relatively low. There are some moderate to heavy infections. Most growers have an opportunity in the next planting season to improve their situation before smut becomes more widespread. We strongly recommend that all growers carefully consider their options for increasing the areas planted to resistant-to-intermediate varieties on their farm.

Growers who still have 80-100% of their farm planted to susceptible varieties will face serious hardship if smut spreads rapidly and starts to cause serious losses. Growers should not panic but work out a plan to increase the area planted to resistant-to-intermediate varieties on their farm.

The plan should involve replacing older ratoons of susceptible varieties with resistant-to-intermediate varieties. Older ratoons of intermediate or resistant varieties that are yielding poorly may have to be replaced as well, but, if they are still giving acceptable yields, growers should consider replacing an older ratoon of a susceptible variety first.

13.0 ACKNOWLEDGMENTS

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APPENDIX 1 - Results for all clones entered in smut trials 7-9, sorted by clone and by trial.

Sorted by clone:

Clone	% smut plant	% smut ratoon	Rating	Trial
BN81-1394	2.9	3.4	1	SM7
BN86-3012	19.1	49.3	7	SM8
BN86-3017	25.4	37.8	7	SM8
BN87-3009	13.8	36.4	6	SM8
BN88-3108	38.8	82.7	9	SM8
BN88-3291	13.1	66.3	8	SM8
BN88-3291	24.5	70.4	8	SM8
BN88-3347	31.5	61	9	SM9
Co1007	1.5	6.6	1	SM8
Co1007	0.0	13.1	3	SM9
CP44-101	14.2	60.3	8	SM8
CP63-588	10.9	14.7	3	SM8
ESK	23.9	65.1	9	SM7
78F1025	4.6	33.7	6	SM8
H56-752	2.8	42.9	8	SM7
IJ76-564	9.1	17.5	3	SM8
KOKEA	17.8	42.4	7	SM8
KQ228	4.0	14.2	1	SM8
KQ228	7.3	8.7	3	SM8
KQ228	3.0	6.2	1	SM9
KQ94-147	12.2	19.4	2	SM9
KQ95-4194	29.0	10.6	1	SM8
KQ95-4194	11.7	5.2	1	SM9
KQ95-4502	36.6	65.9	9	SM7
KQ95-4502	36.9	44.6	7	SM9
KQ95-4684	9.2	35.7	7	SM7
KQ95-4842	21.1	41.9	7	SM8
KQ95-4842	25.2	40.5	7	SM9
KQ95-4958	12.7	33.8	6	SM8
KQ95-4958	10.3	18.3	2	SM9
KQ96-2380	28.0	48.7	7	SM8
KQ96-2380	20.5	32	6	SM9
KQ96-2615	17.8	38.6	7	SM8
KQ96-2615	17.9	45.8	7	SM8
KQ96-2615	7.9	32	6	SM9
KQ96-2667	8.9	32.8	6	SM8
KQ96-2667	9.2	11.8	3	SM9
KQ96-2732	16.2	32.2	6	SM8
KQ96-2785	1.7	1.7	1	SM9
KQ97-4240	17.9	36.8	7	SM9
KQ97-4504	27.6	50.9	7	SM8
KQ97-4504	22.0	21.4	5	SM9
KQ97-4650	14.9	22.3	5	SM8
KQ97-4650	28.2	26.5	5	SM8
KQ97-4650	11.8	23.9	5	SM9
KQ97-5176	7.9	44.5	7	SM8

Sorted by trial:

Clone	% smut plant	% smut ratoon	Rating	Trial
BN81-1394	2.9	3.4	1	SM7
ESK	23.9	65.1	9	SM7
H56-752	2.8	42.9	8	SM7
KQ95-4502	36.6	65.9	9	SM7
KQ95-4684	9.2	35.7	7	SM7
M442-51	4.3	37.9	7	SM7
MIZSAND	15.7	49.1	8	SM7
MIZSOIL	5.0	40.5	7	SM7
MQ94-13	14.0	50.9	9	SM7
MQ94-58	12.0	34.7	7	SM7
MQ94-75	47.4	70.5	9	SM7
MQ94-80	50.7	66.7	9	SM7
NCo310	21.0	41.8	7	SM7
PS79-82	0.0	16.0	1	SM7
PS80-442	1.8	16.6	2	SM7
PS84-16029	18.6	47.9	8	SM7
PS87-10266	3.8	16.9	4	SM7
Q117	20.8	74.5	9	SM7
Q124	2.8	27.7	6	SM7
Q155	4.2	19.5	5	SM7
Q170	26.1	48.3	8	SM7
Q171	0.0	10.5	1	SM7
Q191	29.5	48.7	8	SM7
Q192	52.6	71.9	9	SM7
Q204	34.0	55.5	9	SM7
Q208	2.8	23.9	5	SM7
Q215	7.4	43.3	8	SM7
Q216	21.9	45.8	8	SM7
Q229	16.8	27.4	6	SM7
Q99	0.0	10.5	1	SM7
QA83-1992	20.5	51.7	9	SM7
QA86-700	36.3	59.4	9	SM7
QA89-1746	24.1	56.4	9	SM7
QA90-1227	39.7	60.4	9	SM7
QA90-1742	10.7	25.3	6	SM7
QA90-2024	24.9	68.8	9	SM7
QA90-3055	0.0	17.2	4	SM7
QA90-548	33.7	63.3	9	SM7
QA91-1028	35.2	39.3	7	SM7
QA91-1031	39.3	72.4	9	SM7
QA91-1091	13.0	47.7	8	SM7
QA91-1125	19.4	46.9	8	SM7
QA91-1130	14.2	51.0	8	SM7
QA91-1165	2.8	13.6	3	SM7
QA91-1199	7.9	11.7	1	SM7
QA91-1367	19.5	61.1	9	SM7

KQ97-6371	7.9	18.9	4	SM9
KQ97-7265	32.3	53.3	7	SM8
KQ97-7265	19.5	46.8	8	SM9
KQ97-8228	4.3	19.6	5	SM8
KQ97-8228	5.4	32.5	6	SM8
KQ98-2054	25.4	40.2	7	SM8
KQ98-2054	30.4	58.9	8	SM8
KQ98-851	11.4	42.5	7	SM8
M442-51	4.3	37.9	7	SM7
M442-51	24.3	26.7	5	SM9
M442-51	12.6	36.7	6	SM8
MANDALAY	0.0	0	1	SM8
MIZSAND	15.7	49.1	8	SM7
MIZSOIL	5.0	40.5	7	SM7
MQ81-711	24.3	54.7	8	SM8
MQ84-88	19.0	39.3	7	SM9
MQ85-918	19.9	52.5	7	SM8
MQ92-153	40.8	89.2	9	SM8
MQ92-153	46.9	98.1	9	SM8
MQ92-384	45.2	45.3	7	SM8
MQ92-384	39.6	54.5	7	SM8
MQ92-405	9.4	14.1	3	SM9
MQ93-220	6.3	12.2	4	SM8
MQ94-13	14.0	50.9	9	SM7
MQ94-15	34.8	78.2	9	SM8
MQ94-414	28.0	62.4	9	SM9
MQ94-450	16.4	38.1	6	SM9
MQ94-58	12.0	34.7	7	SM7
MQ94-75	47.4	70.5	9	SM7
MQ94-75	32.7	73.7	8	SM8
MQ94-80	50.7	66.7	9	SM7
MQ95-380	41.1	78.9	9	SM9
MQ95-839	25.8	21.6	4	SM9
NCo310	21.0	41.8	7	SM7
NCo310	38.4	50.7	8	SM9
NCo310	31.0	60	8	SM8
NG57-155	3.1	22.4	4	SM8
PS79-82	3.0	11.2	1	SM8
PS79-82	0.0	11.7	1	SM9
PS79-82	0.0	16.0	1	SM7
PS80-442	1.8	16.6	2	SM7
PS80-442	9.5	23.9	5	SM9
PS84-16029	38.8	64.8	9	SM9
PS84-16029	18.6	47.9	8	SM7
PS84-16029	25.8	47.8	7	SM8
PS87-10266	3.8	16.9	4	SM7
PS87-10266	4.5	20.9	5	SM8
PS87-10266	5.3	21.3	4	SM9
Q117	37.5	67.9	8	SM8
Q117	45.0	59.5	9	SM9
Q117	20.8	74.5	9	SM7
Q124	0.0	5.2	1	SM9
Q124	2.8	27.7	6	SM7

QA91-1436	22.6	38.6	7	SM7
QA91-1460	18.9	63.8	9	SM7
QA91-1549	44.6	67.7	9	SM7
QA91-1552	19.2	34.2	7	SM7
QA91-1768	2.8	15.0	3	SM7
QA91-3469	2.8	13.7	2	SM7
QA91-4966	0.0	18.8	4	SM7
QA92-1160	8.8	46.1	8	SM7
QA92-1258	18.2	51.4	9	SM7
QA92-1361	32.3	55.7	9	SM7
QA92-1431	8.3	52.3	9	SM7
QA92-1639	17.0	56.8	9	SM7
QA92-1657	11.6	46.9	8	SM7
QA92-1707	1.6	35.0	7	SM7
QA92-2115	13.5	38.1	7	SM7
QA92-2275	10.5	52.2	9	SM7
QA92-2301	23.8	52.5	8	SM7
QA92-2395	39.5	53.7	9	SM7
QA92-9001	0.0	23.7	5	SM7
QA92-9004	2.9	27.0	6	SM7
QA93-1017	20.2	56.9	9	SM7
QA93-1155	18.3	82.1	9	SM7
QA93-1394	15.9	50.2	8	SM7
QA93-1395	6.3	39.5	7	SM7
QA93-1780	34.8	66.4	9	SM7
QA93-1850	36.5	70.1	9	SM7
QA93-1856	52.9	63.9	9	SM7
QA93-1945	23.3	57.6	8	SM7
QA93-1979	5.2	28.7	5	SM7
QA93-2002	0.0	18.7	4	SM7
QA93-2763	13.1	42.0	8	SM7
QA93-2795	18.5	54.2	9	SM7
QA94-1009	26.7	53.8	9	SM7
QA94-1076	20.6	54.2	9	SM7
QA94-1137	28.8	57.1	9	SM7
QA94-1169	12.7	47.3	8	SM7
QA94-1208	32.5	27.2	5	SM7
QA94-1221	13.6	53.7	9	SM7
QA94-1223	7.8	44.6	8	SM7
QA94-1332	0.0	7.2	1	SM7
QA94-1483	16.8	55.0	9	SM7
QA94-6257	6.6	44.5	8	SM7
QA94-6259	14.5	34.8	7	SM7
QA94-6261	5.4	28.6	4	SM7
QA94-6552	13.6	53.4	9	SM7
QA94-6577	0.0	33.1	7	SM7
QB92-2300	3.0	33.5	7	SM7
QB92-2301	14.2	42.5	7	SM7
QC83-495	5.3	37.6	7	SM7
QC83-627	0.0	20.4	5	SM7
QC84-252	41.3	62.2	9	SM7
QC85-877	28.7	57.8	9	SM7
QC86-191	8.4	36.7	7	SM7

Q124	4.4	16.6	3	SM8
Q129	7.2	32.2	6	SM8
Q149	14.4	41.7	7	SM8
Q151	0.0	9.4	3	SM8
Q155	4.2	19.5	5	SM7
Q155	4.4	17	4	SM9
Q155	21.1	21.9	5	SM8
Q170	26.1	48.3	8	SM7
Q170	27.9	57.1	8	SM8
Q170	29.3	42.2	7	SM9
Q171	0.0	10.5	1	SM7
Q171	0.0	11.4	1	SM9
Q191	29.5	48.7	8	SM7
Q192	52.6	71.9	9	SM7
Q193	10.4	49.4	7	SM8
Q194	32.9	79.6	9	SM8
Q194	31.6	66.4	9	SM9
Q195	9.1	45.9	7	SM8
Q195	38.1	64.6	9	SM9
Q196	26.9	49.7	7	SM8
Q196	23.7	43.1	7	SM9
Q198	8.2	39.3	7	SM8
Q199	1.4	9.9	2	SM8
Q202	32.9	62.2	8	SM8
Q202	19.7	44.2	8	SM9
Q203	9.6	21.2	5	SM8
Q204	34.0	55.5	9	SM7
Q206	33.8	62.2	7	SM8
Q208	2.8	23.9	5	SM7
Q209	16.7	54.8	7	SM8
Q210	6.7	49.6	7	SM8
Q210	12.5	46.4	8	SM9
Q211	9.1	21.9	5	SM9
Q212	6.1	15.5	3	SM9
Q213	8.2	26.9	5	SM9
Q214	29.9	29.8	6	SM9
Q215	7.4	43.3	8	SM7
Q215	0.0	15.3	2	SM9
Q216	21.9	45.8	8	SM7
Q216	18.3	35.8	7	SM9
Q220	2.5	35.9	6	SM8
Q220	9.7	37.5	7	SM8
Q220	16.3	32.4	6	SM9
Q222	22.5	42.2	7	SM8
Q222	18.6	46	8	SM9
Q223	23.0	45.6	7	SM8
Q225	17.2	42	7	SM8
Q225	22.8	42	7	SM9
Q226	13.9	23.6	5	SM8
Q229	16.8	27.4	6	SM7
Q229	22.3	41.5	7	SM8
Q230	8.8	30.9	6	SM8
Q230	19.7	41.3	7	SM8

QC86-281	28.0	61.5	9	SM7
QC86-807	10.3	53.4	8	SM7
QC87-54	17.7	37.9	7	SM7
QC87-598	37.4	56.8	9	SM7
QC87-6012	5.5	25.2	6	SM7
QC88-138	25.1	56.2	9	SM7
QC90-258	34.3	48.0	8	SM7
QC90-289	17.1	33.9	6	SM7
QC90-6001	16.9	41.0	7	SM7
QC90-6006	2.3	21.0	4	SM7
QC90-601	10.5	35.1	7	SM7
QC90-697	18.1	32.1	6	SM7
QC90-743	33.0	56.9	9	SM7
QC91-1822	7.0	40.5	7	SM7
QC91-1912	5.3	36.3	7	SM7
QC91-2349	32.9	63.1	9	SM7
QC91-423	4.2	31.8	6	SM7
QC91-591	13.9	44.3	7	SM7
QC92-1287	10.0	52.1	9	SM7
QC92-768	16.2	49.7	8	SM7
QC92-778	20.6	61.0	9	SM7
QC92-928	26.1	63.3	9	SM7
QC93-455	10.8	41.6	7	SM7
QC93-6003	1.5	39.4	7	SM7
QC94-2174	11.1	33.3	7	SM7
QH89-1670	8.4	29.6	6	SM7
QH89-1688	31.7	64.4	9	SM7
QH90-1014	26.9	34.5	4	SM7
QH90-1235	35.8	67.5	9	SM7
QH90-1322	7.2	44.4	7	SM7
QH91-1324	25.9	60.4	9	SM7
QH91-7055	27.3	51.8	9	SM7
QH92-1003	32.8	65.6	9	SM7
QH92-2025	17.9	41.6	7	SM7
QH92-2129	24.2	39.3	7	SM7
QH92-2284	8.2	59.4	9	SM7
QH92-2386	20.9	42.7	8	SM7
QH92-2649	15.1	77.3	9	SM7
QH93-1166	33.6	63.2	9	SM7
QH94-1455	35.9	55.2	9	SM7
QH94-2107	28.7	32.1	7	SM7
QH94-2612	15.6	43.3	8	SM7
QH94-2654	35.1	61.4	9	SM7
QH94-2718	22.4	36.8	7	SM7
QN66-2008	14.7	48.5	8	SM7
QN81-1750	26.5	64.0	9	SM7
QN83-1170	28.0	56.0	9	SM7
QN83-399	60.6	68.7	9	SM7
QN84-3588	11.3	28.6	6	SM7
QN86-640	1.3	25.1	6	SM7
QN87-1415	12.7	40.9	8	SM7
QN88-368	3.8	38.9	7	SM7
QN89-1381	31.0	61.6	9	SM7

Q230	11.7	22.8	4	SM9
Q231	5.9	18.5	5	SM8
Q231	13.1	24.8	5	SM9
Q96	1.8	10.9	1	SM9
Q99	0.0	10.5	1	SM7
QA83-1992	20.5	51.7	9	SM7
QA85-572	0.0	5.4	1	SM9
QA86-4014	19.2	53.6	7	SM8
QA86-700	36.3	59.4	9	SM7
QA87-1359	3.1	20.9	5	SM9
QA87-1622	17.2	32.3	6	SM9
QA87-638	25.0	66	8	SM8
QA88-1399	42.9	64.4	8	SM8
QA88-1968	36.0	70.8	9	SM9
QA89-1746	24.1	56.4	9	SM7
QA89-3057	9.2	24.9	5	SM8
QA89-3112	3.3	18.1	2	SM9
QA89-3305	1.8	9.4	1	SM9
QA89-3434	27.6	80.5	9	SM8
QA89-3567	0.0	9.3	1	SM9
QA90-1227	39.7	60.4	9	SM7
QA90-1741	18.5	44	7	SM8
QA90-1742	10.7	25.3	6	SM7
QA90-2024	24.9	68.8	9	SM7
QA90-2024	7.6	55.2	7	SM8
QA90-243	6.8	19.2	4	SM8
QA90-3055	0.0	17.2	4	SM7
QA90-548	33.7	63.3	9	SM7
QA91-1028	35.2	39.3	7	SM7
QA91-1031	39.3	72.4	9	SM7
QA91-1091	13.0	47.7	8	SM7
QA91-1125	19.4	46.9	8	SM7
QA91-1130	14.2	51.0	8	SM7
QA91-1165	2.8	13.6	3	SM7
QA91-1199	7.9	11.7	1	SM7
QA91-1367	19.5	61.1	9	SM7
QA91-1436	22.6	38.6	7	SM7
QA91-1460	18.9	63.8	9	SM7
QA91-1549	44.6	67.7	9	SM7
QA91-1552	19.2	34.2	7	SM7
QA91-1768	2.8	15.0	3	SM7
QA91-3469	2.8	13.7	2	SM7
QA91-3693	25.6	62.1	8	SM8
QA91-4821	14.3	33.9	6	SM8
QA91-4966	0.0	18.8	4	SM7
QA92-1105	1.9	4.6	1	SM9
QA92-1160	8.8	46.1	8	SM7
QA92-1258	18.2	51.4	9	SM7
QA92-1361	32.3	55.7	9	SM7
QA92-1431	8.3	52.3	9	SM7
QA92-1639	17.0	56.8	9	SM7
QA92-1657	11.6	46.9	8	SM7
QA92-1707	1.6	35.0	7	SM7

QN89-1902	26.3	47.8	8	SM7
QN89-2208	24.4	47.4	8	SM7
QN89-69	2.8	22.3	5	SM7
QN90-1230	6.1	48.6	8	SM7
QN90-1849	34.3	51.1	9	SM7
QN90-840	15.0	45.8	8	SM7
QN91-3381	24.1	49.2	8	SM7
QN91-444	30.5	35.6	7	SM7
QN91-529	27.9	59.3	9	SM7
QN91-850	16.1	42.1	8	SM7
QN91-91	23.5	42.7	7	SM7
QN92-1234	0.0	2.8	1	SM7
QN92-1249	25.7	49.2	8	SM7
QN92-1461	12.2	52.8	8	SM7
QN92-1542	40.0	66.5	9	SM7
QN92-157	0.0	19.2	4	SM7
QN92-1794	15.7	52.7	8	SM7
QN92-1881	28.4	64.1	9	SM7
QN92-2158	43.6	77.8	9	SM7
QN92-2219	35.9	52.0	8	SM7
QN92-2278	30.6	69.4	9	SM7
QN92-426	10.7	34.5	6	SM7
QN92-458	9.1	21.5	5	SM7
QN92-731	2.6	32.6	6	SM7
QN92-816	16.3	65.0	9	SM7
QN92-903	8.4	37.0	7	SM7
QN93-1304	19.9	48.0	8	SM7
QN93-1392	31.4	69.4	9	SM7
QN93-309	6.7	26.7	6	SM7
QN93-3423	29.7	77.5	9	SM7
QN93-3542	60.0	68.5	9	SM7
QN93-3670	13.1	40.0	7	SM7
QN93-4779	29.7	65.1	9	SM7
QN93-4931	33.5	53.5	9	SM7
QN93-5073	41.8	64.6	9	SM7
QN93-56	12.8	46.0	8	SM7
QN93-602	11.9	62.4	9	SM7
QN93-736	16.6	51.8	9	SM7
QN93-740	39.2	56.4	9	SM7
QN93-928	34.8	58.2	9	SM7
QN94-6006	13.0	51.8	8	SM7
QN94-6011	46.6	71.7	9	SM7
QS84-1265	32.2	51.1	8	SM7
QS84-2555	11.4	39.8	7	SM7
QS85-1509	0.0	16.7	4	SM7
QS85-1555	31.2	58.9	9	SM7
QS85-2236	5.9	42.1	8	SM7
QS85-7102	6.9	50.0	8	SM7
QS85-7327	23.8	51.8	8	SM7
QS87-7268	33.9	52.0	8	SM7
QS87-7367	16.5	44.2	8	SM7
QS87-7434	8.6	38.6	7	SM7
QS88-7371	4.3	20.5	4	SM7

QA92-1799	9.5	24.2	5	SM9
QA92-2115	13.5	38.1	7	SM7
QA92-2275	10.5	52.2	9	SM7
QA92-2301	23.8	52.5	8	SM7
QA92-2395	39.5	53.7	9	SM7
QA92-9001	0.0	23.7	5	SM7
QA92-9004	2.9	27.0	6	SM7
QA93-1017	20.2	56.9	9	SM7
QA93-1018	36.1	71.4	8	SM8
QA93-1018	43.2	86.5	9	SM8
QA93-1112	0.0	22.2	5	SM9
QA93-1155	18.3	82.1	9	SM7
QA93-1394	15.9	50.2	8	SM7
QA93-1395	6.3	39.5	7	SM7
QA93-1780	34.8	66.4	9	SM7
QA93-1850	36.5	70.1	9	SM7
QA93-1856	52.9	63.9	9	SM7
QA93-1856	51.1	69.9	9	SM9
QA93-1945	23.3	57.6	8	SM7
QA93-1956	3.2	21.6	5	SM9
QA93-1979	5.2	28.7	5	SM7
QA93-1979	5.2	14.8	2	SM8
QA93-1992	29.5	46	7	SM8
QA93-2002	0.0	18.7	4	SM7
QA93-2763	13.1	42.0	8	SM7
QA93-2763	21.4	38.3	7	SM8
QA93-2768	6.3	72.9	8	SM8
QA93-2768	24.0	59.3	9	SM9
QA93-2795	18.5	54.2	9	SM7
QA94-1009	26.7	53.8	9	SM7
QA94-1076	20.6	54.2	9	SM7
QA94-1137	28.8	57.1	9	SM7
QA94-1137	39.0	62.2	8	SM8
QA94-1169	12.7	47.3	8	SM7
QA94-1208	32.5	27.2	5	SM7
QA94-1221	13.6	53.7	9	SM7
QA94-1221	25.4	62	8	SM8
QA94-1223	7.8	44.6	8	SM7
QA94-1332	0.0	7.2	1	SM7
QA94-1483	16.8	55.0	9	SM7
QA94-1483	31.7	55.7	8	SM8
QA94-1483	24.1	43.3	7	SM9
QA94-6003	27.9	73.6	9	SM9
QA94-6006	18.6	44.6	7	SM8
QA94-6257	6.6	44.5	8	SM7
QA94-6257	16.8	55.8	8	SM8
QA94-6259	14.5	34.8	7	SM7
QA94-6261	5.4	28.6	4	SM7
QA94-6552	13.6	53.4	9	SM7
QA94-6577	0.0	33.1	7	SM7
QA94-6577	0.0	26.8	5	SM8
QA95-1236	2.9	24.3	5	SM8
QA95-1603	38.7	80.7	9	SM8

QS90-6004	27.0	50.8	8	SM7
QS90-6006	10.1	23.8	5	SM7
QS91-7266	21.5	61.4	9	SM7
QS91-7347	17.8	49.0	8	SM7
QS92-286	26.1	69.7	9	SM7
QS93-2613	2.6	30.8	6	SM7
QS96-6006	0.0	27.2	6	SM7
QS97-7188	15.2	45.7	8	SM7
BN86-3012	19.1	49.3	7	SM8
BN86-3017	25.4	37.8	7	SM8
BN87-3009	13.8	36.4	6	SM8
BN88-3108	38.8	82.7	9	SM8
BN88-3291	13.1	66.3	8	SM8
BN88-3291	24.5	70.4	8	SM8
CO1007	1.5	6.6	1	SM8
CP44-101	14.2	60.3	8	SM8
CP63-588	10.9	14.7	3	SM8
78F1025	4.6	33.7	6	SM8
IJ76-564	9.1	17.5	3	SM8
KOKEA	17.8	42.4	7	SM8
KQ228	4.0	14.2	1	SM8
KQ228	7.3	8.7	3	SM8
KQ95-4194	29.0	10.6	1	SM8
KQ95-4842	21.1	41.9	7	SM8
KQ95-4958	12.7	33.8	6	SM8
KQ96-2380	28.0	48.7	7	SM8
KQ96-2615	17.8	38.6	7	SM8
KQ96-2615	17.9	45.8	7	SM8
KQ96-2667	8.9	32.8	6	SM8
KQ96-2732	16.2	32.2	6	SM8
KQ97-4504	27.6	50.9	7	SM8
KQ97-4650	14.9	22.3	5	SM8
KQ97-4650	28.2	26.5	5	SM8
KQ97-5176	7.9	44.5	7	SM8
KQ97-7265	32.3	53.3	7	SM8
KQ97-8228	4.3	19.6	5	SM8
KQ97-8228	5.4	32.5	6	SM8
KQ98-2054	25.4	40.2	7	SM8
KQ98-2054	30.4	58.9	8	SM8
KQ98-851	11.4	42.5	7	SM8
M442-51	12.6	36.7	6	SM8
MANDALAY	0.0	0	1	SM8
MQ81-711	24.3	54.7	8	SM8
MQ85-918	19.9	52.5	7	SM8
MQ92-153	40.8	89.2	9	SM8
MQ92-153	46.9	98.1	9	SM8
MQ92-384	45.2	45.3	7	SM8
MQ92-384	39.6	54.5	7	SM8
MQ93-220	6.3	12.2	4	SM8
MQ94-15	34.8	78.2	9	SM8
MQ94-75	32.7	73.7	8	SM8
NCo310	31.0	60	8	SM8
NG57-155	3.1	22.4	4	SM8

QA95-1707	13.1	14.9	3	SM9
QA95-2182	28.5	40.7	7	SM8
QA95-2186	0.0	17.6	2	SM9
QA95-2313	32.5	49.5	7	SM8
QA95-2313	9.8	8.5	2	SM9
QA95-2367	1.5	40.4	7	SM8
QA95-5119	8.9	64.6	8	SM8
QA95-5207	33.4	69.4	8	SM8
QA95-5207	29.3	61.4	8	SM9
QA96-1351	0.0	3.7	1	SM8
QA96-1361	24.4	56.8	8	SM8
QA96-1361	13.9	59.5	8	SM8
QA96-1361	15.6	29.8	6	SM9
QB92-2300	3.0	33.5	7	SM7
QB92-2301	14.2	42.5	7	SM7
QC71-413	13.7	70.3	8	SM8
QC83-495	5.3	37.6	7	SM7
QC83-627	0.0	20.4	5	SM7
QC83-627	0.0	11.3	2	SM8
QC83-700	31.1	43.9	7	SM8
QC84-252	41.3	62.2	9	SM7
QC85-298	20.0	48.9	7	SM8
QC85-877	28.7	57.8	9	SM7
QC86-137	37.1	77	9	SM8
QC86-137	41.3	62.4	9	SM9
QC86-191	8.4	36.7	7	SM7
QC86-281	28.0	61.5	9	SM7
QC86-501	31.1	77.4	8	SM8
QC86-501	35.1	65.9	9	SM9
QC86-807	10.3	53.4	8	SM7
QC87-54	17.7	37.9	7	SM7
QC87-598	37.4	56.8	9	SM7
QC87-6012	5.5	25.2	6	SM7
QC88-138	25.1	56.2	9	SM7
QC88-6022	7.6	25.1	6	SM8
QC88-73	17.1	32.9	6	SM8
QC89-561	29.4	64.6	8	SM8
QC89-561	12.8	50.9	8	SM9
QC89-6002	35.6	60.5	8	SM8
QC89-6015	26.7	37.4	7	SM9
QC90-258	34.3	48.0	8	SM7
QC90-289	17.1	33.9	6	SM7
QC90-298	1.7	1.9	1	SM9
QC90-6001	16.9	41.0	7	SM7
QC90-6001	20.7	13.7	2	SM9
QC90-6003	14.6	17.5	2	SM9
QC90-6006	2.3	21.0	4	SM7
QC90-601	10.5	35.1	7	SM7
QC90-697	18.1	32.1	6	SM7
QC90-743	33.0	56.9	9	SM7
QC91-1822	7.0	40.5	7	SM7
QC91-1912	5.3	36.3	7	SM7
QC91-2349	32.9	63.1	9	SM7

PS79-82	3.0	11.2	1	SM8
PS84-16029	25.8	47.8	7	SM8
PS87-10266	4.5	20.9	5	SM8
Q117	37.5	67.9	8	SM8
Q124	4.4	16.6	3	SM8
Q129	7.2	32.2	6	SM8
Q149	14.4	41.7	7	SM8
Q151	0.0	9.4	3	SM8
Q155	21.1	21.9	5	SM8
Q170	27.9	57.1	8	SM8
Q193	10.4	49.4	7	SM8
Q194	32.9	79.6	9	SM8
Q195	9.1	45.9	7	SM8
Q196	26.9	49.7	7	SM8
Q198	8.2	39.3	7	SM8
Q199	1.4	9.9	2	SM8
Q202	32.9	62.2	8	SM8
Q203	9.6	21.2	5	SM8
Q206	33.8	62.2	7	SM8
Q209	16.7	54.8	7	SM8
Q210	6.7	49.6	7	SM8
Q220	2.5	35.9	6	SM8
Q220	9.7	37.5	7	SM8
Q222	22.5	42.2	7	SM8
Q223	23.0	45.6	7	SM8
Q225	17.2	42	7	SM8
Q226	13.9	23.6	5	SM8
Q229	22.3	41.5	7	SM8
Q230	8.8	30.9	6	SM8
Q230	19.7	41.3	7	SM8
Q231	5.9	18.5	5	SM8
QA86-4014	19.2	53.6	7	SM8
QA87-638	25.0	66	8	SM8
QA88-1399	42.9	64.4	8	SM8
QA89-3057	9.2	24.9	5	SM8
QA89-3434	27.6	80.5	9	SM8
QA90-1741	18.5	44	7	SM8
QA90-2024	7.6	55.2	7	SM8
QA90-243	6.8	19.2	4	SM8
QA91-3693	25.6	62.1	8	SM8
QA91-4821	14.3	33.9	6	SM8
QA93-1018	36.1	71.4	8	SM8
QA93-1018	43.2	86.5	9	SM8
QA93-1979	5.2	14.8	2	SM8
QA93-1992	29.5	46	7	SM8
QA93-2763	21.4	38.3	7	SM8
QA93-2768	6.3	72.9	8	SM8
QA94-1137	39.0	62.2	8	SM8
QA94-1221	25.4	62	8	SM8
QA94-1483	31.7	55.7	8	SM8
QA94-6006	18.6	44.6	7	SM8
QA94-6257	16.8	55.8	8	SM8
QA94-6577	0.0	26.8	5	SM8

QC91-423	4.2	31.8	6	SM7
QC91-423	11.7	35.3	6	SM8
QC91-423	5.8	25.1	5	SM9
QC91-591	13.9	44.3	7	SM7
QC91-6015	0.0	3.3	1	SM9
QC92-1187	14.1	51.7	7	SM8
QC92-1188	41.8	59.4	8	SM8
QC92-1188	27.6	47.2	7	SM9
QC92-1216	11.2	51.7	7	SM8
QC92-1287	10.0	52.1	9	SM7
QC92-244	17.0	56.1	7	SM8
QC92-300	24.8	55.3	8	SM9
QC92-452	24.6	27.8	6	SM9
QC92-619	27.9	54.2	7	SM8
QC92-626	23.9	36.5	7	SM9
QC92-714	12.6	17.1	2	SM9
QC92-723	14.7	56.7	8	SM8
QC92-768	16.2	49.7	8	SM7
QC92-778	20.6	61.0	9	SM7
QC92-785	14.0	36.3	4	SM9
QC92-928	26.1	63.3	9	SM7
QC93-1188	44.6	93.2	9	SM8
QC93-1210	0.0	7.3	1	SM8
QC93-1457	25.7	29.3	6	SM9
QC93-1594	26.5	52.4	8	SM9
QC93-455	10.8	41.6	7	SM7
QC93-455	9.9	84.6	9	SM8
QC93-455	21.8	47.5	8	SM9
QC93-6003	1.5	39.4	7	SM7
QC93-745	1.6	14.3	1	SM8
QC93-889	11.1	5.4	1	SM9
QC93-894	18.4	34.6	6	SM8
QC93-896	15.9	12.8	3	SM8
QC93-896	13.1	22.9	5	SM9
QC94-1364	24.4	66.5	8	SM8
QC94-1771	7.2	23.4	3	SM8
QC94-2174	11.1	33.3	7	SM7
QC94-2174	14.1	40.2	7	SM8
QC94-2249	19.3	36.3	6	SM8
QC94-2889	17.2	46.4	7	SM8
QC95-1188	25.9	68.6	8	SM8
QC95-1697	36.7	61.9	8	SM8
QC95-1697	25.6	67.4	8	SM8
QC95-1697	29.3	57.2	8	SM9
QC95-2212	19.1	71.4	8	SM8
QC95-3156	18.2	69.5	8	SM8
QC95-3156	31.8	57.1	8	SM9
QC95-3182	14.0	53	8	SM8
QC95-3254	19.8	51.9	7	SM8
QC97-1398	39.8	58	8	SM9
QC97-1445	24.5	39.9	7	SM9
QC97-1470	16.1	31	6	SM9
QC97-1673	28.3	11.2	3	SM9

QA95-1236	2.9	24.3	5	SM8
QA95-1603	38.7	80.7	9	SM8
QA95-2182	28.5	40.7	7	SM8
QA95-2313	32.5	49.5	7	SM8
QA95-2367	1.5	40.4	7	SM8
QA95-5119	8.9	64.6	8	SM8
QA95-5207	33.4	69.4	8	SM8
QA96-1351	0.0	3.7	1	SM8
QA96-1361	24.4	56.8	8	SM8
QA96-1361	13.9	59.5	8	SM8
QC71-413	13.7	70.3	8	SM8
QC83-627	0.0	11.3	2	SM8
QC83-700	31.1	43.9	7	SM8
QC85-298	20.0	48.9	7	SM8
QC86-137	37.1	77	9	SM8
QC86-501	31.1	77.4	8	SM8
QC88-6022	7.6	25.1	6	SM8
QC88-73	17.1	32.9	6	SM8
QC89-561	29.4	64.6	8	SM8
QC89-6002	35.6	60.5	8	SM8
QC91-423	11.7	35.3	6	SM8
QC92-1187	14.1	51.7	7	SM8
QC92-1188	41.8	59.4	8	SM8
QC92-1216	11.2	51.7	7	SM8
QC92-244	17.0	56.1	7	SM8
QC92-619	27.9	54.2	7	SM8
QC92-723	14.7	56.7	8	SM8
QC93-1188	44.6	93.2	9	SM8
QC93-1210	0.0	7.3	1	SM8
QC93-455	9.9	84.6	9	SM8
QC93-745	1.6	14.3	1	SM8
QC93-894	18.4	34.6	6	SM8
QC93-896	15.9	12.8	3	SM8
QC94-1364	24.4	66.5	8	SM8
QC94-1771	7.2	23.4	3	SM8
QC94-2174	14.1	40.2	7	SM8
QC94-2249	19.3	36.3	6	SM8
QC94-2889	17.2	46.4	7	SM8
QC95-1188	25.9	68.6	8	SM8
QC95-1697	36.7	61.9	8	SM8
QC95-1697	25.6	67.4	8	SM8
QC95-2212	19.1	71.4	8	SM8
QC95-3156	18.2	69.5	8	SM8
QC95-3182	14.0	53	8	SM8
QC95-3254	19.8	51.9	7	SM8
QH89-1405	12.1	36.3	7	SM8
QH89-1412	15.7	48.1	7	SM8
QH89-175	21.6	45.8	7	SM8
QH89-236	11.5	38.7	7	SM8
QH90-1258	25.9	76.6	9	SM8
QH90-1261	25.0	75.8	8	SM8
QH91-1058	24.3	31	6	SM8
QH91-3009	25.8	44.5	7	SM8

QC97-2059	29.0	46	8	SM9
QC97-2108	6.4	24.2	5	SM9
QC97-2194	4.6	25.4	5	SM9
QC98-2025	23.7	61.4	9	SM9
QC98-2044	16.2	40.5	7	SM9
QC98-2151	2.7	21.3	4	SM9
QC98-2243	22.8	38.3	6	SM9
QC98-2277	12.3	17.7	4	SM9
QC98-2286	10.2	36.7	7	SM9
QC98-2395	1.4	7.3	1	SM9
QC98-2491	26.3	47.5	8	SM9
QC98-2551	17.6	8.7	1	SM9
QC98-2589	22.2	63.4	9	SM9
QC98-4103	0.0	7.5	1	SM9
QC98-4117	8.0	37.9	7	SM9
QC98-4214	18.3	54.2	8	SM9
QC98-4304	15.0	17.5	3	SM9
QC98-4313	21.9	50.4	8	SM9
QH89-1405	12.1	36.3	7	SM8
QH89-1412	15.7	48.1	7	SM8
QH89-1670	8.4	29.6	6	SM7
QH89-1688	31.7	64.4	9	SM7
QH89-175	21.6	45.8	7	SM8
QH89-236	11.5	38.7	7	SM8
QH89-479	12.5	27.8	6	SM9
QH89-488	18.9	35.8	7	SM9
QH90-1014	26.9	34.5	4	SM7
QH90-1235	35.8	67.5	9	SM7
QH90-1258	25.9	76.6	9	SM8
QH90-1258	19.5	54.2	8	SM9
QH90-1261	25.0	75.8	8	SM8
QH90-1261	21.0	36	7	SM9
QH90-1322	7.2	44.4	7	SM7
QH91-1058	24.3	31	6	SM8
QH91-1324	25.9	60.4	9	SM7
QH91-3009	25.8	44.5	7	SM8
QH91-7027	39.9	84.5	9	SM8
QH91-7050	24.4	57.6	8	SM8
QH91-7055	27.3	51.8	9	SM7
QH91-7055	34.4	65.3	8	SM8
QH91-7055	24.4	43.4	7	SM9
QH92-1003	32.8	65.6	9	SM7
QH92-1548	40.0	54.6	8	SM9
QH92-2025	17.9	41.6	7	SM7
QH92-2129	24.2	39.3	7	SM7
QH92-2284	8.2	59.4	9	SM7
QH92-2386	20.9	42.7	8	SM7
QH92-2649	15.1	77.3	9	SM7
QH92-2649	24.0	43.5	7	SM8
QH93-1166	33.6	63.2	9	SM7
QH93-1197	14.2	27	5	SM8
QH93-1197	8.8	35.5	6	SM8
QH93-1533	28.6	70.9	8	SM8

QH91-7027	39.9	84.5	9	SM8
QH91-7050	24.4	57.6	8	SM8
QH91-7055	34.4	65.3	8	SM8
QH92-2649	24.0	43.5	7	SM8
QH93-1197	14.2	27	5	SM8
QH93-1197	8.8	35.5	6	SM8
QH93-1533	28.6	70.9	8	SM8
QH94-1643	29.7	63	8	SM8
QH94-2440	38.2	73.7	8	SM8
QN78-228	48.0	71.6	8	SM8
QN78-460	9.2	24.5	5	SM8
QN80-617	26.7	74.9	8	SM8
QN82-314	14.0	24.7	5	SM8
QN83-657	19.9	36.8	7	SM8
QN84-2483	30.8	41.3	7	SM8
QN84-3588	19.3	18.9	3	SM8
QN84-4136	3.4	17.6	3	SM8
QN84-4146	26.4	71.3	8	SM8
QN84-4736	10.8	43	7	SM8
QN85-1819	41.3	78.3	9	SM8
QN85-289	10.3	41.9	7	SM8
QN85-70	3.2	34.6	6	SM8
QN86-1128	23.3	63.2	8	SM8
QN86-1336	26.1	44.1	7	SM8
QN86-1531	20.7	55.9	7	SM8
QN86-2312	22.1	32.6	6	SM8
QN86-2313	9.6	27.6	6	SM8
QN86-424	8.8	44.4	7	SM8
QN86-672	4.1	15.7	3	SM8
QN86-758	7.5	2.8	1	SM8
QN87-1169	0.0	3.3	1	SM8
QN87-2109	18.4	16	4	SM8
QN88-1293	26.2	42.5	7	SM8
QN88-1296	37.1	52.6	7	SM8
QN88-1862	39.4	49.1	7	SM8
QN88-2097	0.0	0	1	SM8
QN88-572	14.1	62.7	8	SM8
QN88-650	62.5	91.3	9	SM8
QN88-805	18.9	57.5	8	SM8
QN88-805	27.5	69.5	8	SM8
QN89-1043	12.9	34.1	6	SM8
QN89-1281	49.6	79.4	9	SM8
QN89-1641	36.0	37.4	7	SM8
QN89-1727	37.5	78	9	SM8
QN89-1727	51.3	80.2	9	SM8
QN89-1765	23.8	60.6	8	SM8
QN89-181	20.0	54.2	7	SM8
QN89-2208	13.1	30.7	6	SM8
QN89-2449	1.6	34.5	6	SM8
QN90-395	24.2	53.6	8	SM8
QN90-492	26.3	30.5	6	SM8
QN90-840	10.0	49.5	7	SM8
QN91-1095	37.2	59.7	8	SM8

QH93-1533	12.4	42.1	7	SM9
QH94-1455	35.9	55.2	9	SM7
QH94-1643	29.7	63	8	SM8
QH94-2107	28.7	32.1	7	SM7
QH94-2440	38.2	73.7	8	SM8
QH94-2612	15.6	43.3	8	SM7
QH94-2654	35.1	61.4	9	SM7
QH94-2718	22.4	36.8	7	SM7
QN66-2008	14.7	48.5	8	SM7
QN66-2008	22.4	40.2	7	SM9
QN78-228	48.0	71.6	8	SM8
QN78-430	12.5	8.3	1	SM9
QN78-460	9.2	24.5	5	SM8
QN80-617	26.7	74.9	8	SM8
QN81-1750	26.5	64.0	9	SM7
QN82-1241	29.1	38.9	6	SM9
QN82-1338	14.6	33.5	6	SM9
QN82-314	14.0	24.7	5	SM8
QN83-1170	28.0	56.0	9	SM7
QN83-399	60.6	68.7	9	SM7
QN83-657	19.9	36.8	7	SM8
QN84-2483	30.8	41.3	7	SM8
QN84-2483	15.5	26.8	5	SM9
QN84-2483	29.8	43.4	7	SM9
QN84-3588	11.3	28.6	6	SM7
QN84-3588	19.3	18.9	3	SM8
QN84-4136	3.4	17.6	3	SM8
QN84-4146	26.4	71.3	8	SM8
QN84-4319	6.3	41.7	7	SM9
QN84-4736	10.8	43	7	SM8
QN85-1271	10.1	14.8	2	SM9
QN85-1819	41.3	78.3	9	SM8
QN85-2598	29.1	61.1	8	SM9
QN85-289	10.3	41.9	7	SM8
QN85-70	3.2	34.6	6	SM8
QN86-1009	28.4	50.1	8	SM9
QN86-1128	23.3	63.2	8	SM8
QN86-1128	22.2	53.2	8	SM9
QN86-1336	26.1	44.1	7	SM8
QN86-1531	20.7	55.9	7	SM8
QN86-189	17.6	21.1	3	SM9
QN86-2158	20.4	16.3	4	SM9
QN86-2312	22.1	32.6	6	SM8
QN86-2313	9.6	27.6	6	SM8
QN86-2313	3.0	22.4	5	SM9
QN86-424	8.8	44.4	7	SM8
QN86-5238	27.8	55.7	8	SM9
QN86-640	1.3	25.1	6	SM7
QN86-640	2.1	27.6	5	SM9
QN86-672	4.1	15.7	3	SM8
QN86-758	7.5	2.8	1	SM8
QN87-1169	0.0	3.3	1	SM8
QN87-1415	12.7	40.9	8	SM7

QN91-295	4.8	14.2	3	SM8
QN91-3285	25.8	57.2	7	SM8
QN91-3898	16.0	22.1	5	SM8
QN91-564	38.4	89.6	9	SM8
QN92-1234	1.8	2.1	1	SM8
QN93-3907	7.7	33.1	6	SM8
QN93-4857	5.4	47.8	7	SM8
QN95-1029	34.0	67.2	8	SM8
QN95-1250	10.4	49.8	7	SM8
QN95-1412	18.1	61.9	8	SM8
QN95-1479	17.4	55.8	8	SM8
QN95-1479	19.2	84.5	9	SM8
QN95-1633	45.7	76.9	9	SM8
QN95-1697	18.9	43.2	7	SM8
QN95-1700	39.3	84.2	9	SM8
QN95-1867	25.8	52.5	8	SM8
QN95-1896	1.9	29	6	SM8
QN95-6020	29.2	60.9	8	SM8
QN95-685	8.4	45.7	7	SM8
QN95-807	38.3	76.8	8	SM8
QN95-807	35.3	80.6	9	SM8
QN95-87	17.8	56.5	8	SM8
QN95-939	13.1	26.4	5	SM8
QS72-1058	22.1	51.3	7	SM8
QS82-714	9.3	29.5	6	SM8
QS84-2788	12.3	59.2	8	SM8
QS85-797	66.4	77	9	SM8
QS85-929	18.1	23.1	5	SM8
QS87-7199	36.9	57.6	8	SM8
QS87-7245	20.4	47	7	SM8
QS87-7430	2.9	31.4	6	SM8
QS87-7505	21.6	50	7	SM8
QS87-8090	21.4	59.3	8	SM8
QS88-7073	6.7	8.9	2	SM8
QS88-7073	8.5	14.2	4	SM8
QS88-9095	3.8	17.1	3	SM8
QS88-9268	26.8	56.3	8	SM8
QS89-7124	9.0	52.8	7	SM8
QS89-7651	43.5	78.5	9	SM8
QS89-7738	24.5	56.3	8	SM8
QS89-7870	23.4	61.2	8	SM8
QS89-8124	12.4	23.6	4	SM8
QS90-6002	18.7	58.2	8	SM8
QS90-7085	40.8	70.6	8	SM8
QS90-7085	40.9	85.9	9	SM8
QS90-7146	31.2	75.6	8	SM8
QS90-7187	25.7	62.7	8	SM8
QS91-7172	5.7	28.3	5	SM8
QS92-2423	21.2	82.8	9	SM8
QS92-250	48.6	83.8	9	SM8
QS92-330	21.0	32.2	5	SM8
QS92-636	10.8	38.6	7	SM8
QS93-2188	1.3	26.3	5	SM8

QN87-1978	4.9	8.3	1	SM9
QN87-2109	18.4	16	4	SM8
QN87-2109	14.4	15.8	3	SM9
QN87-881	22.7	43.8	7	SM9
QN88-1293	26.2	42.5	7	SM8
QN88-1296	37.1	52.6	7	SM8
QN88-1862	39.4	49.1	7	SM8
QN88-1862	25.8	50.7	8	SM9
QN88-2097	0.0	0	1	SM8
QN88-2097	0.0	0	1	SM9
QN88-2129	6.9	14.4	3	SM9
QN88-368	3.8	38.9	7	SM7
QN88-572	14.1	62.7	8	SM8
QN88-650	62.5	91.3	9	SM8
QN88-650	43.3	69.3	9	SM9
QN88-805	18.9	57.5	8	SM8
QN88-805	27.5	69.5	8	SM8
QN89-1043	12.9	34.1	6	SM8
QN89-1043	7.2	22.6	5	SM9
QN89-1180	27.3	59.5	8	SM9
QN89-1281	49.6	79.4	9	SM8
QN89-1281	45.5	75.1	9	SM9
QN89-1381	31.0	61.6	9	SM7
QN89-1641	36.0	37.4	7	SM8
QN89-169	9.3	33.2	6	SM9
QN89-1727	37.5	78	9	SM8
QN89-1727	51.3	80.2	9	SM8
QN89-1727	42.0	87.3	9	SM9
QN89-1765	23.8	60.6	8	SM8
QN89-181	20.0	54.2	7	SM8
QN89-181	18.1	56	8	SM9
QN89-1902	26.3	47.8	8	SM7
QN89-1902	27.3	37.8	7	SM9
QN89-2208	24.4	47.4	8	SM7
QN89-2208	13.1	30.7	6	SM8
QN89-2208	9.4	35.6	7	SM9
QN89-2449	1.6	34.5	6	SM8
QN89-686	8.7	27.9	5	SM9
QN89-69	2.8	22.3	5	SM7
QN89-917	52.9	80.4	9	SM9
QN90-1230	6.1	48.6	8	SM7
QN90-1230	17.5	19.7	4	SM9
QN90-1774	23.1	34	6	SM9
QN90-1849	34.3	51.1	9	SM7
QN90-395	24.2	53.6	8	SM8
QN90-492	26.3	30.5	6	SM8
QN90-840	15.0	45.8	8	SM7
QN90-840	10.0	49.5	7	SM8
QN90-920	26.5	43.3	7	SM9
QN91-1095	37.2	59.7	8	SM8
QN91-1298	10.6	15.6	4	SM9
QN91-295	4.8	14.2	3	SM8
QN91-3285	25.8	57.2	7	SM8

QS93-286	14.3	38.2	7	SM8
QS94-18	4.0	14.8	3	SM8
QS94-2167	9.3	63.6	8	SM8
QS94-2329	3.1	11.9	2	SM8
QS94-2395	38.8	60.2	8	SM8
QS94-2451	33.2	63.4	8	SM8
QS94-2614	18.2	53.5	8	SM8
QS94-2641	11.2	33.7	6	SM8
QS94-551	24.7	54.6	8	SM8
QS94-876	15.0	23.6	5	SM8
QS94-91	2.1	43.8	6	SM8
QS95-2473	18.6	45.1	7	SM8
QS95-276	26.1	50.3	7	SM8
QS96-2174	3.0	5	1	SM8
QW90-79	15.1	63.5	8	SM8
QW90-8	37.9	77.8	9	SM8
TS65-28	13.4	39	6	SM8
BN88-3347	31.5	61	9	SM9
Co1007	0.0	13.1	3	SM9
KQ228	3.0	6.2	1	SM9
KQ94-147	12.2	19.4	2	SM9
KQ95-4194	11.7	5.2	1	SM9
KQ95-4502	36.9	44.6	7	SM9
KQ95-4842	25.2	40.5	7	SM9
KQ95-4958	10.3	18.3	2	SM9
KQ96-2380	20.5	32	6	SM9
KQ96-2615	7.9	32	6	SM9
KQ96-2667	9.2	11.8	3	SM9
KQ96-2785	1.7	1.7	1	SM9
KQ97-4240	17.9	36.8	7	SM9
KQ97-4504	22.0	21.4	5	SM9
KQ97-4650	11.8	23.9	5	SM9
KQ97-6371	7.9	18.9	4	SM9
KQ97-7265	19.5	46.8	8	SM9
M442-51	24.3	26.7	5	SM9
MQ84-88	19.0	39.3	7	SM9
MQ92-405	9.4	14.1	3	SM9
MQ94-414	28.0	62.4	9	SM9
MQ94-450	16.4	38.1	6	SM9
MQ95-380	41.1	78.9	9	SM9
MQ95-839	25.8	21.6	4	SM9
NCo310	38.4	50.7	8	SM9
PS79-82	0.0	11.7	1	SM9
PS80-442	9.5	23.9	5	SM9
PS84-16029	38.8	64.8	9	SM9
PS87-10266	5.3	21.3	4	SM9
Q117	45.0	59.5	9	SM9
Q124	0.0	5.2	1	SM9
Q155	4.4	17	4	SM9
Q170	29.3	42.2	7	SM9
Q171	0.0	11.4	1	SM9
Q194	31.6	66.4	9	SM9
Q195	38.1	64.6	9	SM9

QN91-3285	49.7	43.2	7	SM9
QN91-3381	24.1	49.2	8	SM7
QN91-3563	21.9	34.1	6	SM9
QN91-3851	14.2	47.7	8	SM9
QN91-3898	16.0	22.1	5	SM8
QN91-429	22.9	59	9	SM9
QN91-444	30.5	35.6	7	SM7
QN91-529	27.9	59.3	9	SM7
QN91-564	38.4	89.6	9	SM8
QN91-564	28.2	49.1	8	SM9
QN91-850	16.1	42.1	8	SM7
QN91-91	23.5	42.7	7	SM7
QN92-1234	0.0	2.8	1	SM7
QN92-1234	1.8	2.1	1	SM8
QN92-1249	25.7	49.2	8	SM7
QN92-1461	12.2	52.8	8	SM7
QN92-1542	40.0	66.5	9	SM7
QN92-1542	18.8	58.5	8	SM9
QN92-157	0.0	19.2	4	SM7
QN92-1794	15.7	52.7	8	SM7
QN92-1881	28.4	64.1	9	SM7
QN92-2158	43.6	77.8	9	SM7
QN92-2219	35.9	52.0	8	SM7
QN92-2278	30.6	69.4	9	SM7
QN92-2367	9.1	31.3	6	SM9
QN92-2511	28.8	78.8	9	SM9
QN92-426	10.7	34.5	6	SM7
QN92-458	9.1	21.5	5	SM7
QN92-731	2.6	32.6	6	SM7
QN92-816	16.3	65.0	9	SM7
QN92-903	8.4	37.0	7	SM7
QN93-1057	37.5	69.3	9	SM9
QN93-1304	19.9	48.0	8	SM7
QN93-1392	31.4	69.4	9	SM7
QN93-309	6.7	26.7	6	SM7
QN93-3423	29.7	77.5	9	SM7
QN93-3542	60.0	68.5	9	SM7
QN93-3548	21.7	47	8	SM9
QN93-3670	13.1	40.0	7	SM7
QN93-3670	13.1	11.6	1	SM9
QN93-3907	7.7	33.1	6	SM8
QN93-3907	12.4	38.2	7	SM9
QN93-4111	23.0	36.1	7	SM9
QN93-4731	17.3	16.2	2	SM9
QN93-4779	29.7	65.1	9	SM7
QN93-4779	24.7	55.3	8	SM9
QN93-4857	5.4	47.8	7	SM8
QN93-4931	33.5	53.5	9	SM7
QN93-5073	41.8	64.6	9	SM7
QN93-56	12.8	46.0	8	SM7
QN93-602	11.9	62.4	9	SM7
QN93-736	16.6	51.8	9	SM7
QN93-740	39.2	56.4	9	SM7

Q196	23.7	43.1	7	SM9
Q202	19.7	44.2	8	SM9
Q210	12.5	46.4	8	SM9
Q211	9.1	21.9	5	SM9
Q212	6.1	15.5	3	SM9
Q213	8.2	26.9	5	SM9
Q214	29.9	29.8	6	SM9
Q215	0.0	15.3	2	SM9
Q216	18.3	35.8	7	SM9
Q220	16.3	32.4	6	SM9
Q222	18.6	46	8	SM9
Q225	22.8	42	7	SM9
Q230	11.7	22.8	4	SM9
Q231	13.1	24.8	5	SM9
Q96	1.8	10.9	1	SM9
QA85-572	0.0	5.4	1	SM9
QA87-1359	3.1	20.9	5	SM9
QA87-1622	17.2	32.3	6	SM9
QA88-1968	36.0	70.8	9	SM9
QA89-3112	3.3	18.1	2	SM9
QA89-3305	1.8	9.4	1	SM9
QA89-3567	0.0	9.3	1	SM9
QA92-1105	1.9	4.6	1	SM9
QA92-1799	9.5	24.2	5	SM9
QA93-1112	0.0	22.2	5	SM9
QA93-1856	51.1	69.9	9	SM9
QA93-1956	3.2	21.6	5	SM9
QA93-2768	24.0	59.3	9	SM9
QA94-1483	24.1	43.3	7	SM9
QA94-6003	27.9	73.6	9	SM9
QA95-1707	13.1	14.9	3	SM9
QA95-2186	0.0	17.6	2	SM9
QA95-2313	9.8	8.5	2	SM9
QA95-5207	29.3	61.4	8	SM9
QA96-1361	15.6	29.8	6	SM9
QC86-137	41.3	62.4	9	SM9
QC86-501	35.1	65.9	9	SM9
QC89-561	12.8	50.9	8	SM9
QC89-6015	26.7	37.4	7	SM9
QC90-298	1.7	1.9	1	SM9
QC90-6001	20.7	13.7	2	SM9
QC90-6003	14.6	17.5	2	SM9
QC91-423	5.8	25.1	5	SM9
QC91-6015	0.0	3.3	1	SM9
QC92-1188	27.6	47.2	7	SM9
QC92-300	24.8	55.3	8	SM9
QC92-452	24.6	27.8	6	SM9
QC92-626	23.9	36.5	7	SM9
QC92-714	12.6	17.1	2	SM9
QC92-785	14.0	36.3	4	SM9
QC93-1457	25.7	29.3	6	SM9
QC93-1594	26.5	52.4	8	SM9
QC93-455	21.8	47.5	8	SM9

QN93-928	34.8	58.2	9	SM7
QN93-928	38.5	40.1	7	SM9
QN93-957	6.1	21.5	4	SM9
QN94-6006	13.0	51.8	8	SM7
QN94-6006	11.9	11.8	1	SM9
QN94-6011	46.6	71.7	9	SM7
QN94-6016	31.2	42.8	7	SM9
QN95-1029	34.0	67.2	8	SM8
QN95-1250	10.4	49.8	7	SM8
QN95-1250	1.4	30	5	SM9
QN95-1412	18.1	61.9	8	SM8
QN95-1479	17.4	55.8	8	SM8
QN95-1479	19.2	84.5	9	SM8
QN95-1599	5.5	28	6	SM9
QN95-1633	45.7	76.9	9	SM8
QN95-1697	18.9	43.2	7	SM8
QN95-1700	39.3	84.2	9	SM8
QN95-1867	25.8	52.5	8	SM8
QN95-1867	12.6	17.7	3	SM9
QN95-1896	1.9	29	6	SM8
QN95-523	29.7	53.6	8	SM9
QN95-6020	29.2	60.9	8	SM8
QN95-6020	28.2	56.3	8	SM9
QN95-685	8.4	45.7	7	SM8
QN95-807	38.3	76.8	8	SM8
QN95-807	35.3	80.6	9	SM8
QN95-807	33.7	73.8	9	SM9
QN95-87	17.8	56.5	8	SM8
QN95-939	13.1	26.4	5	SM8
QN96-102	40.5	64.8	9	SM9
QN96-1050	18.1	43.3	7	SM9
QN96-1103	20.8	36	6	SM9
QN96-1131	36.1	37.5	7	SM9
QN96-1178	13.4	39.6	6	SM9
QN96-1184	32.6	68.3	9	SM9
QN96-1232	27.9	57.9	8	SM9
QN96-1253	1.6	43	7	SM9
QN96-15	36.0	50.7	8	SM9
QN96-1658	32.6	24.9	5	SM9
QN96-1771	26.8	52.3	8	SM9
QN96-1794	8.3	36	7	SM9
QN96-1835	0.0	29	6	SM9
QN96-2047	9.7	40.2	7	SM9
QN96-281	20.8	48.9	8	SM9
QN96-437	19.0	48.7	8	SM9
QN96-556	26.6	41	7	SM9
QN96-610	8.6	11.7	1	SM9
QN96-768	31.9	35.5	7	SM9
QN97-1754	11.9	31.2	6	SM9
QN97-2173	12.0	30.8	6	SM9
QN97-2328	3.3	3.2	1	SM9
QN97-863	23.4	36.6	6	SM9
QN99-1998	20.8	34.5	6	SM9

QC93-889	11.1	5.4	1	SM9
QC93-896	13.1	22.9	5	SM9
QC95-1697	29.3	57.2	8	SM9
QC95-3156	31.8	57.1	8	SM9
QC97-1398	39.8	58	8	SM9
QC97-1445	24.5	39.9	7	SM9
QC97-1470	16.1	31	6	SM9
QC97-1673	28.3	11.2	3	SM9
QC97-2059	29.0	46	8	SM9
QC97-2108	6.4	24.2	5	SM9
QC97-2194	4.6	25.4	5	SM9
QC98-2025	23.7	61.4	9	SM9
QC98-2044	16.2	40.5	7	SM9
QC98-2151	2.7	21.3	4	SM9
QC98-2243	22.8	38.3	6	SM9
QC98-2277	12.3	17.7	4	SM9
QC98-2286	10.2	36.7	7	SM9
QC98-2395	1.4	7.3	1	SM9
QC98-2491	26.3	47.5	8	SM9
QC98-2551	17.6	8.7	1	SM9
QC98-2589	22.2	63.4	9	SM9
QC98-4103	0.0	7.5	1	SM9
QC98-4117	8.0	37.9	7	SM9
QC98-4214	18.3	54.2	8	SM9
QC98-4304	15.0	17.5	3	SM9
QC98-4313	21.9	50.4	8	SM9
QH89-479	12.5	27.8	6	SM9
QH89-488	18.9	35.8	7	SM9
QH90-1258	19.5	54.2	8	SM9
QH90-1261	21.0	36	7	SM9
QH91-7055	24.4	43.4	7	SM9
QH92-1548	40.0	54.6	8	SM9
QH93-1533	12.4	42.1	7	SM9
QN66-2008	22.4	40.2	7	SM9
QN78-430	12.5	8.3	1	SM9
QN82-1241	29.1	38.9	6	SM9
QN82-1338	14.6	33.5	6	SM9
QN84-2483	15.5	26.8	5	SM9
QN84-2483	29.8	43.4	7	SM9
QN84-4319	6.3	41.7	7	SM9
QN85-1271	10.1	14.8	2	SM9
QN85-2598	29.1	61.1	8	SM9
QN86-1009	28.4	50.1	8	SM9
QN86-1128	22.2	53.2	8	SM9
QN86-189	17.6	21.1	3	SM9
QN86-2158	20.4	16.3	4	SM9
QN86-2313	3.0	22.4	5	SM9
QN86-5238	27.8	55.7	8	SM9
QN86-640	2.1	27.6	5	SM9
QN87-1978	4.9	8.3	1	SM9
QN87-2109	14.4	15.8	3	SM9
QN87-881	22.7	43.8	7	SM9
QN88-1862	25.8	50.7	8	SM9

QS72-1058	22.1	51.3	7	SM8
QS72-1058	25.9	65.7	9	SM9
QS78-1181	14.9	41.1	7	SM9
QS81-546	18.3	39.5	7	SM9
QS82-714	9.3	29.5	6	SM8
QS84-1265	32.2	51.1	8	SM7
QS84-2134	28.0	43.7	7	SM9
QS84-2555	11.4	39.8	7	SM7
QS84-2788	12.3	59.2	8	SM8
QS85-1509	0.0	16.7	4	SM7
QS85-1555	31.2	58.9	9	SM7
QS85-2236	5.9	42.1	8	SM7
QS85-7102	6.9	50.0	8	SM7
QS85-7327	23.8	51.8	8	SM7
QS85-7335	26.9	50.1	8	SM9
QS85-797	66.4	77	9	SM8
QS85-929	18.1	23.1	5	SM8
QS87-7144	37.6	63.4	9	SM9
QS87-7199	36.9	57.6	8	SM8
QS87-7245	20.4	47	7	SM8
QS87-7268	33.9	52.0	8	SM7
QS87-7367	16.5	44.2	8	SM7
QS87-7427	0.0	1.8	1	SM9
QS87-7430	2.9	31.4	6	SM8
QS87-7434	8.6	38.6	7	SM7
QS87-7505	21.6	50	7	SM8
QS87-8090	21.4	59.3	8	SM8
QS88-7073	6.7	8.9	2	SM8
QS88-7073	8.5	14.2	4	SM8
QS88-7371	4.3	20.5	4	SM7
QS88-9095	3.8	17.1	3	SM8
QS88-9268	26.8	56.3	8	SM8
QS89-7124	9.0	52.8	7	SM8
QS89-7651	43.5	78.5	9	SM8
QS89-7738	24.5	56.3	8	SM8
QS89-7870	23.4	61.2	8	SM8
QS89-8124	12.4	23.6	4	SM8
QS90-6002	18.7	58.2	8	SM8
QS90-6004	27.0	50.8	8	SM7
QS90-6006	10.1	23.8	5	SM7
QS90-7085	40.8	70.6	8	SM8
QS90-7085	40.9	85.9	9	SM8
QS90-7146	31.2	75.6	8	SM8
QS90-7187	25.7	62.7	8	SM8
QS91-7172	5.7	28.3	5	SM8
QS91-7266	21.5	61.4	9	SM7
QS91-7347	17.8	49.0	8	SM7
QS92-2423	21.2	82.8	9	SM8
QS92-2423	10.0	28.2	6	SM9
QS92-250	48.6	83.8	9	SM8
QS92-286	26.1	69.7	9	SM7
QS92-330	21.0	32.2	5	SM8
QS92-636	10.8	38.6	7	SM8

QN88-2097	0.0	0	1	SM9
QN88-2129	6.9	14.4	3	SM9
QN88-650	43.3	69.3	9	SM9
QN89-1043	7.2	22.6	5	SM9
QN89-1180	27.3	59.5	8	SM9
QN89-1281	45.5	75.1	9	SM9
QN89-169	9.3	33.2	6	SM9
QN89-1727	42.0	87.3	9	SM9
QN89-181	18.1	56	8	SM9
QN89-1902	27.3	37.8	7	SM9
QN89-2208	9.4	35.6	7	SM9
QN89-686	8.7	27.9	5	SM9
QN89-917	52.9	80.4	9	SM9
QN90-1230	17.5	19.7	4	SM9
QN90-1774	23.1	34	6	SM9
QN90-920	26.5	43.3	7	SM9
QN91-1298	10.6	15.6	4	SM9
QN91-3285	49.7	43.2	7	SM9
QN91-3563	21.9	34.1	6	SM9
QN91-3851	14.2	47.7	8	SM9
QN91-429	22.9	59	9	SM9
QN91-564	28.2	49.1	8	SM9
QN92-1542	18.8	58.5	8	SM9
QN92-2367	9.1	31.3	6	SM9
QN92-2511	28.8	78.8	9	SM9
QN93-1057	37.5	69.3	9	SM9
QN93-3548	21.7	47	8	SM9
QN93-3670	13.1	11.6	1	SM9
QN93-3907	12.4	38.2	7	SM9
QN93-4111	23.0	36.1	7	SM9
QN93-4731	17.3	16.2	2	SM9
QN93-4779	24.7	55.3	8	SM9
QN93-928	38.5	40.1	7	SM9
QN93-957	6.1	21.5	4	SM9
QN94-6006	11.9	11.8	1	SM9
QN94-6016	31.2	42.8	7	SM9
QN95-1250	1.4	30	5	SM9
QN95-1599	5.5	28	6	SM9
QN95-1867	12.6	17.7	3	SM9
QN95-523	29.7	53.6	8	SM9
QN95-6020	28.2	56.3	8	SM9
QN95-807	33.7	73.8	9	SM9
QN96-102	40.5	64.8	9	SM9
QN96-1050	18.1	43.3	7	SM9
QN96-1103	20.8	36	6	SM9
QN96-1131	36.1	37.5	7	SM9
QN96-1178	13.4	39.6	6	SM9
QN96-1184	32.6	68.3	9	SM9
QN96-1232	27.9	57.9	8	SM9
QN96-1253	1.6	43	7	SM9
QN96-15	36.0	50.7	8	SM9
QN96-1658	32.6	24.9	5	SM9
QN96-1771	26.8	52.3	8	SM9

QS92-639	21.3	28.7	6	SM9
QS93-2188	1.3	26.3	5	SM8
QS93-2188	2.9	11.2	1	SM9
QS93-2613	2.6	30.8	6	SM7
QS93-286	14.3	38.2	7	SM8
QS94-18	4.0	14.8	3	SM8
QS94-2167	9.3	63.6	8	SM8
QS94-2167	15.5	40	4	SM9
QS94-2329	3.1	11.9	2	SM8
QS94-2329	4.8	12.2	3	SM9
QS94-2395	38.8	60.2	8	SM8
QS94-2451	33.2	63.4	8	SM8
QS94-2614	18.2	53.5	8	SM8
QS94-2614	18.0	34.1	7	SM9
QS94-2641	11.2	33.7	6	SM8
QS94-2682	30.0	46.3	8	SM9
QS94-498	43.6	62.9	9	SM9
QS94-551	24.7	54.6	8	SM8
QS94-876	15.0	23.6	5	SM8
QS94-91	2.1	43.8	6	SM8
QS94-91	8.1	26.8	6	SM9
QS95-2122	20.0	42.7	7	SM9
QS95-2394	26.6	39.8	7	SM9
QS95-2473	18.6	45.1	7	SM8
QS95-2473	13.9	33.1	6	SM9
QS95-2552	27.9	56.8	8	SM9
QS95-2617	24.2	21.6	5	SM9
QS95-2645	22.6	49.1	8	SM9
QS95-276	26.1	50.3	7	SM8
QS95-520	33.5	39.2	7	SM9
QS95-6019	4.9	10.9	1	SM9
QS95-762	22.7	48.9	8	SM9
QS96-2015	14.3	51.9	8	SM9
QS96-2026	14.8	22.5	5	SM9
QS96-2174	3.0	5	1	SM8
QS96-2174	0.0	6.8	1	SM9
QS96-2408	9.1	26.6	3	SM9
QS96-2787	8.5	9.4	1	SM9
QS96-2817	9.4	16.1	4	SM9
QS96-457	5.9	30.8	6	SM9
QS96-6006	0.0	27.2	6	SM7
QS96-6006	0.0	9.9	1	SM9
QS96-6176	5.7	26.2	5	SM9
QS96-6178	16.2	44.1	7	SM9
QS96-73	17.1	53.3	8	SM9
QS96-788	24.3	32.5	6	SM9
QS96-986	8.2	16.8	2	SM9
QS97-164	37.8	63.4	9	SM9
QS97-2033	23.4	33.2	6	SM9
QS97-2067	13.7	29.1	6	SM9
QS97-233	19.2	50.3	8	SM9
QS97-36	16.5	37.5	6	SM9
QS97-7188	15.2	45.7	8	SM7

QN96-1794	8.3	36	7	SM9
QN96-1835	0.0	29	6	SM9
QN96-2047	9.7	40.2	7	SM9
QN96-281	20.8	48.9	8	SM9
QN96-437	19.0	48.7	8	SM9
QN96-556	26.6	41	7	SM9
QN96-610	8.6	11.7	1	SM9
QN96-768	31.9	35.5	7	SM9
QN97-1754	11.9	31.2	6	SM9
QN97-2173	12.0	30.8	6	SM9
QN97-2328	3.3	3.2	1	SM9
QN97-863	23.4	36.6	6	SM9
QN99-1998	20.8	34.5	6	SM9
QS72-1058	25.9	65.7	9	SM9
QS78-1181	14.9	41.1	7	SM9
QS81-546	18.3	39.5	7	SM9
QS84-2134	28.0	43.7	7	SM9
QS85-7335	26.9	50.1	8	SM9
QS87-7144	37.6	63.4	9	SM9
QS87-7427	0.0	1.8	1	SM9
QS92-2423	10.0	28.2	6	SM9
QS92-639	21.3	28.7	6	SM9
QS93-2188	2.9	11.2	1	SM9
QS94-2167	15.5	40	4	SM9
QS94-2329	4.8	12.2	3	SM9
QS94-2614	18.0	34.1	7	SM9
QS94-2682	30.0	46.3	8	SM9
QS94-498	43.6	62.9	9	SM9
QS94-91	8.1	26.8	6	SM9
QS95-2122	20.0	42.7	7	SM9
QS95-2394	26.6	39.8	7	SM9
QS95-2473	13.9	33.1	6	SM9
QS95-2552	27.9	56.8	8	SM9
QS95-2617	24.2	21.6	5	SM9
QS95-2645	22.6	49.1	8	SM9
QS95-520	33.5	39.2	7	SM9
QS95-6019	4.9	10.9	1	SM9
QS95-762	22.7	48.9	8	SM9
QS96-2015	14.3	51.9	8	SM9
QS96-2026	14.8	22.5	5	SM9
QS96-2174	0.0	6.8	1	SM9
QS96-2408	9.1	26.6	3	SM9
QS96-2787	8.5	9.4	1	SM9
QS96-2817	9.4	16.1	4	SM9
QS96-457	5.9	30.8	6	SM9
QS96-6006	0.0	9.9	1	SM9
QS96-6176	5.7	26.2	5	SM9
QS96-6178	16.2	44.1	7	SM9
QS96-73	17.1	53.3	8	SM9
QS96-788	24.3	32.5	6	SM9
QS96-986	8.2	16.8	2	SM9
QS97-164	37.8	63.4	9	SM9
QS97-2033	23.4	33.2	6	SM9

QW89-60	29.7	48.2	8	SM9
QW90-79	15.1	63.5	8	SM8
QW90-8	37.9	77.8	9	SM8
ROC1	34.2	48.7	8	SM9
SP70-3370	3.4	28.1	6	SM9
SP79-2313	1.7	18.9	5	SM9
TS65-28	13.4	39	6	SM8

QS97-2067	13.7	29.1	6	SM9
QS97-233	19.2	50.3	8	SM9
QS97-36	16.5	37.5	6	SM9
QW89-60	29.7	48.2	8	SM9
ROC1	34.2	48.7	8	SM9
SP70-3370	3.4	28.1	6	SM9
SP79-2313	1.7	18.9	5	SM9

APPENDIX 2 - Mean rating for clones in smut trials 7-9 and the number of trials in which the clone has been tested.

Sorted by Clone:			Sorted by rating:		
Clone	**Rating**	**No. Trials**	**Clone**	**Rating**	**No. Trials**
BN81-1394	1	1	BN81-1394	1	1
BN86-3012	7	1	KQ95-4194	1	2
BN86-3017	7	1	KQ96-2785	1	1
BN87-3009	6	1	MANDALAY	1	1
BN88-3108	9	1	PS79-82	1	3
BN88-3291	8	2	Q171	1	2
BN88-3347	9	1	Q99	1	1
Co1007	2	2	QA85-572	1	1
CP44-101	8	1	QA89-3305	1	1
CP63-588	3	1	QA89-3567	1	1
ESK	9	1	QA91-1199	1	1
78F1025	6	1	QA92-1105	1	1
H56-752	8	1	QA94-1332	1	1
IJ76-564	3	1	QA96-1351	1	1
KOKEA	7	1	QC90-298	1	1
KQ228	2	3	QC91-6015	1	1
KQ94-147	2	1	QC93-1210	1	1
KQ95-4194	1	2	QC93-745	1	1
KQ95-4502	8	2	QC93-889	1	1
KQ95-4684	7	1	QC98-2395	1	1
KQ95-4842	7	2	QC98-2551	1	1
KQ95-4958	4	2	QC98-4103	1	1
KQ96-2380	7	2	QN78-430	1	1
KQ96-2615	7	3	QN86-758	1	1
KQ96-2667	5	2	QN87-1169	1	1
KQ96-2732	6	1	QN87-1978	1	1
KQ96-2785	1	1	QN88-2097	1	2
KQ97-4240	7	1	QN92-1234	1	2
KQ97-4504	6	2	QN96-610	1	1
KQ97-4650	5	3	QN97-2328	1	1
KQ97-5176	7	1	QS87-7427	1	1
KQ97-6371	4	1	QS95-6019	1	1
KQ97-7265	8	2	QS96-2174	1	2
KQ97-8228	6	2	QS96-2787	1	1
KQ98-2054	8	2	CO1007	2	2
KQ98-851	7	1	KQ228	2	3
M442-51	6	3	KQ94-147	2	1
MANDALAY	1	1	Q199	2	1
MIZSAND	8	1	QA89-3112	2	1
MIZSOIL	7	1	QA91-3469	2	1
MQ81-711	8	1	QA95-2186	2	1
MQ84-88	7	1	QC90-6003	2	1
MQ85-918	7	1	QC92-714	2	1
MQ92-153	9	2	QN85-1271	2	1
MQ92-384	7	2	QN93-4731	2	1
MQ92-405	3	1	QS96-986	2	1
MQ93-220	4	1	CP63-588	3	1
MQ94-13	9	1	IJ76-564	3	1

MQ94-15	9	1
MQ94-414	9	1
MQ94-450	6	1
MQ94-58	7	1
MQ94-75	9	2
MQ94-80	9	1
MQ95-380	9	1
MQ95-839	4	1
NCo310	8	3
NG57-155	4	1
PS79-82	1	3
PS80-442	4	2
PS84-16029	8	3
PS87-10266	4	3
Q117	9	3
Q124	3	3
Q129	6	1
Q149	7	1
Q151	3	1
Q155	5	3
Q170	8	3
Q171	1	2
Q191	8	1
Q192	9	1
Q193	7	1
Q194	9	2
Q195	8	2
Q196	7	2
Q198	7	1
Q199	2	1
Q202	8	2
Q203	5	1
Q204	9	1
Q206	7	1
Q208	5	1
Q209	7	1
Q210	8	2
Q211	5	1
Q212	3	1
Q213	5	1
Q214	6	1
Q215	5	2
Q216	8	2
Q220	6	3
Q222	8	2
Q223	7	1
Q225	7	2
Q226	5	1
Q229	7	2
Q230	6	3
Q231	5	2
Q99	1	1
QA83-1992	9	1

MQ92-405	3	1
Q124	3	3
Q151	3	1
Q212	3	1
QA91-1165	3	1
QA91-1768	3	1
QA95-1707	3	1
QC94-1771	3	1
QC97-1673	3	1
QC98-4304	3	1
QN84-4136	3	1
QN86-189	3	1
QN86-672	3	1
QN88-2129	3	1
QN91-295	3	1
QS88-7073	3	2
QS88-9095	3	1
QS93-2188	3	2
QS94-18	3	1
QS94-2329	3	2
QS96-2408	3	1
KQ95-4958	4	2
KQ97-6371	4	1
MQ93-220	4	1
MQ95-839	4	1
NG57-155	4	1
PS80-442	4	2
PS87-10266	4	3
QA90-243	4	1
QA90-3055	4	1
QA91-4966	4	1
QA93-1979	4	2
QA93-2002	4	1
QA94-6261	4	1
QC83-627	4	2
QC90-6006	4	1
QC92-785	4	1
QC93-896	4	2
QC98-2151	4	1
QC98-2277	4	1
QH90-1014	4	1
QN86-2158	4	1
QN87-2109	4	2
QN91-1298	4	1
QN92-157	4	1
QN93-3670	4	2
QN93-957	4	1
QS85-1509	4	1
QS88-7371	4	1
QS89-8124	4	1
QS96-2817	4	1
QS96-6006	4	2
KQ96-2667	5	2

QA85-572	1	1
QA86-4014	7	1
QA86-700	9	1
QA87-1359	5	1
QA87-1622	6	1
QA87-638	8	1
QA88-1399	8	1
QA88-1968	9	1
QA89-1746	9	1
QA89-3057	5	1
QA89-3112	2	1
QA89-3305	1	1
QA89-3434	9	1
QA89-3567	1	1
QA90-1227	9	1
QA90-1741	7	1
QA90-1742	6	1
QA90-2024	8	2
QA90-243	4	1
QA90-3055	4	1
QA90-548	9	1
QA91-1028	7	1
QA91-1031	9	1
QA91-1091	8	1
QA91-1125	8	1
QA91-1130	8	1
QA91-1165	3	1
QA91-1199	1	1
QA91-1367	9	1
QA91-1436	7	1
QA91-1460	9	1
QA91-1549	9	1
QA91-1552	7	1
QA91-1768	3	1
QA91-3469	2	1
QA91-3693	8	1
QA91-4821	6	1
QA91-4966	4	1
QA92-1105	1	1
QA92-1160	8	1
QA92-1258	9	1
QA92-1361	9	1
QA92-1431	9	1
QA92-1639	9	1
QA92-1657	8	1
QA92-1707	7	1
QA92-1799	5	1
QA92-2115	7	1
QA92-2275	9	1
QA92-2301	8	1
QA92-2395	9	1
QA92-9001	5	1
QA92-9004	6	1

KQ97-4650	5	3
Q155	5	3
Q203	5	1
Q208	5	1
Q211	5	1
Q213	5	1
Q215	5	2
Q226	5	1
Q231	5	2
QA87-1359	5	1
QA89-3057	5	1
QA92-1799	5	1
QA92-9001	5	1
QA93-1112	5	1
QA93-1956	5	1
QA94-1208	5	1
QA95-1236	5	1
QA95-2313	5	2
QC90-6001	5	2
QC97-2108	5	1
QC97-2194	5	1
QN78-460	5	1
QN82-314	5	1
QN84-3588	5	2
QN89-686	5	1
QN89-69	5	1
QN91-3898	5	1
QN92-458	5	1
QN94-6006	5	2
QN95-939	5	1
QN96-1658	5	1
QS85-929	5	1
QS90-6006	5	1
QS91-7172	5	1
QS92-330	5	1
QS94-876	5	1
QS95-2617	5	1
QS96-2026	5	1
QS96-6176	5	1
SP79-2313	5	1
BN87-3009	6	1
78F1025	6	1
KQ96-2732	6	1
KQ97-4504	6	2
KQ97-8228	6	2
M442-51	6	3
MQ94-450	6	1
Q129	6	1
Q214	6	1
Q220	6	3
Q230	6	3
QA87-1622	6	1
QA90-1742	6	1

QA93-1017	9	1
QA93-1018	9	2
QA93-1112	5	1
QA93-1155	9	1
QA93-1394	8	1
QA93-1395	7	1
QA93-1780	9	1
QA93-1850	9	1
QA93-1856	9	2
QA93-1945	8	1
QA93-1956	5	1
QA93-1979	4	2
QA93-1992	7	1
QA93-2002	4	1
QA93-2763	8	2
QA93-2768	9	2
QA93-2795	9	1
QA94-1009	9	1
QA94-1076	9	1
QA94-1137	9	2
QA94-1169	8	1
QA94-1208	5	1
QA94-1221	9	2
QA94-1223	8	1
QA94-1332	1	1
QA94-1483	8	3
QA94-6003	9	1
QA94-6006	7	1
QA94-6257	8	2
QA94-6259	7	1
QA94-6261	4	1
QA94-6552	9	1
QA94-6577	6	2
QA95-1236	5	1
QA95-1603	9	1
QA95-1707	3	1
QA95-2182	7	1
QA95-2186	2	1
QA95-2313	5	2
QA95-2367	7	1
QA95-5119	8	1
QA95-5207	8	2
QA96-1351	1	1
QA96-1361	7	3
QB92-2300	7	1
QB92-2301	7	1
QC71-413	8	1
QC83-495	7	1
QC83-627	4	2
QC83-700	7	1
QC84-252	9	1
QC85-298	7	1
QC85-877	9	1

QA91-4821	6	1
QA92-9004	6	1
QA94-6577	6	2
QC87-6012	6	1
QC88-6022	6	1
QC88-73	6	1
QC90-289	6	1
QC90-697	6	1
QC91-423	6	3
QC92-452	6	1
QC93-1457	6	1
QC93-894	6	1
QC94-2249	6	1
QC97-1470	6	1
QC98-2243	6	1
QH89-1670	6	1
QH89-479	6	1
QH91-1058	6	1
QH93-1197	6	2
QN82-1241	6	1
QN82-1338	6	1
QN84-2483	6	3
QN85-70	6	1
QN86-2312	6	1
QN86-2313	6	2
QN86-640	6	2
QN89-1043	6	2
QN89-169	6	1
QN89-2449	6	1
QN90-1230	6	2
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QN92-426	6	1
QN92-731	6	1
QN93-309	6	1
QN95-1250	6	2
QN95-1599	6	1
QN95-1867	6	2
QN95-1896	6	1
QN96-1103	6	1
QN96-1178	6	1
QN96-1835	6	1
QN97-1754	6	1
QN97-2173	6	1
QN97-863	6	1
QN99-1998	6	1
QS82-714	6	1
QS87-7430	6	1
QS92-639	6	1
QS93-2613	6	1
QS94-2167	6	2

QC86-137	9	2
QC86-191	7	1
QC86-281	9	1
QC86-501	9	2
QC86-807	8	1
QC87-54	7	1
QC87-598	9	1
QC87-6012	6	1
QC88-138	9	1
QC88-6022	6	1
QC88-73	6	1
QC89-561	8	2
QC89-6002	8	1
QC89-6015	7	1
QC90-258	8	1
QC90-289	6	1
QC90-298	1	1
QC90-6001	5	2
QC90-6003	2	1
QC90-6006	4	1
QC90-601	7	1
QC90-697	6	1
QC90-743	9	1
QC91-1822	7	1
QC91-1912	7	1
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QC91-423	6	3
QC91-591	7	1
QC91-6015	1	1
QC92-1187	7	1
QC92-1188	8	2
QC92-1216	7	1
QC92-1287	9	1
QC92-244	7	1
QC92-300	8	1
QC92-452	6	1
QC92-619	7	1
QC92-626	7	1
QC92-714	2	1
QC92-723	8	1
QC92-768	8	1
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QC92-785	4	1
QC92-928	9	1
QC93-1188	9	1
QC93-1210	1	1
QC93-1457	6	1
QC93-1594	8	1
QC93-455	8	3
QC93-6003	7	1
QC93-745	1	1
QC93-889	1	1
QC93-894	6	1

QS94-2641	6	1
QS94-91	6	2
QS96-457	6	1
QS96-788	6	1
QS97-2033	6	1
QS97-2067	6	1
QS97-36	6	1
SP70-3370	6	1
TS65-28	6	1
BN86-3012	7	1
BN86-3017	7	1
KOKEA	7	1
KQ95-4684	7	1
KQ95-4842	7	2
KQ96-2380	7	2
KQ96-2615	7	3
KQ97-4240	7	1
KQ97-5176	7	1
KQ98-851	7	1
MIZSOIL	7	1
MQ84-88	7	1
MQ85-918	7	1
MQ92-384	7	2
MQ94-58	7	1
Q149	7	1
Q193	7	1
Q196	7	2
Q198	7	1
Q206	7	1
Q209	7	1
Q223	7	1
Q225	7	2
Q229	7	2
QA86-4014	7	1
QA90-1741	7	1
QA91-1028	7	1
QA91-1436	7	1
QA91-1552	7	1
QA92-1707	7	1
QA92-2115	7	1
QA93-1395	7	1
QA93-1992	7	1
QA94-6006	7	1
QA94-6259	7	1
QA95-2182	7	1
QA95-2367	7	1
QA96-1361	7	3
QB92-2300	7	1
QB92-2301	7	1
QC83-495	7	1
QC83-700	7	1
QC85-298	7	1
QC86-191	7	1

QC93-896	4	2
QC94-1364	8	1
QC94-1771	3	1
QC94-2174	7	2
QC94-2249	6	1
QC94-2889	7	1
QC95-1188	8	1
QC95-1697	8	3
QC95-2212	8	1
QC95-3156	8	2
QC95-3182	8	1
QC95-3254	7	1
QC97-1398	8	1
QC97-1445	7	1
QC97-1470	6	1
QC97-1673	3	1
QC97-2059	8	1
QC97-2108	5	1
QC97-2194	5	1
QC98-2025	9	1
QC98-2044	7	1
QC98-2151	4	1
QC98-2243	6	1
QC98-2277	4	1
QC98-2286	7	1
QC98-2395	1	1
QC98-2491	8	1
QC98-2551	1	1
QC98-2589	9	1
QC98-4103	1	1
QC98-4117	7	1
QC98-4214	8	1
QC98-4304	3	1
QC98-4313	8	1
QH89-1405	7	1
QH89-1412	7	1
QH89-1670	6	1
QH89-1688	9	1
QH89-175	7	1
QH89-236	7	1
QH89-479	6	1
QH89-488	7	1
QH90-1014	4	1
QH90-1235	9	1
QH90-1258	9	2
QH90-1261	8	2
QH90-1322	7	1
QH91-1058	6	1
QH91-1324	9	1
QH91-3009	7	1
QH91-7027	9	1
QH91-7050	8	1
QH91-7055	8	3

QC87-54	7	1
QC89-6015	7	1
QC90-601	7	1
QC91-1822	7	1
QC91-1912	7	1
QC91-591	7	1
QC92-1187	7	1
QC92-1216	7	1
QC92-244	7	1
QC92-619	7	1
QC92-626	7	1
QC93-6003	7	1
QC94-2174	7	2
QC94-2889	7	1
QC95-3254	7	1
QC97-1445	7	1
QC98-2044	7	1
QC98-2286	7	1
QC98-4117	7	1
QH89-1405	7	1
QH89-1412	7	1
QH89-175	7	1
QH89-236	7	1
QH89-488	7	1
QH90-1322	7	1
QH91-3009	7	1
QH92-2025	7	1
QH92-2129	7	1
QH94-2107	7	1
QH94-2718	7	1
QN83-657	7	1
QN84-4319	7	1
QN84-4736	7	1
QN85-289	7	1
QN86-1336	7	1
QN86-1531	7	1
QN86-424	7	1
QN87-881	7	1
QN88-1293	7	1
QN88-1296	7	1
QN88-368	7	1
QN89-1641	7	1
QN89-2208	7	3
QN90-920	7	1
QN91-3285	7	2
QN91-444	7	1
QN91-91	7	1
QN92-903	7	1
QN93-3907	7	2
QN93-4111	7	1
QN93-4857	7	1
QN94-6016	7	1
QN95-1697	7	1

QH92-1003	9	1
QH92-1548	8	1
QH92-2025	7	1
QH92-2129	7	1
QH92-2284	9	1
QH92-2386	8	1
QH92-2649	8	2
QH93-1166	9	1
QH93-1197	6	2
QH93-1533	8	2
QH94-1455	9	1
QH94-1643	8	1
QH94-2107	7	1
QH94-2440	8	1
QH94-2612	8	1
QH94-2654	9	1
QH94-2718	7	1
QN66-2008	8	2
QN78-228	8	1
QN78-430	1	1
QN78-460	5	1
QN80-617	8	1
QN81-1750	9	1
QN82-1241	6	1
QN82-1338	6	1
QN82-314	5	1
QN83-1170	9	1
QN83-399	9	1
QN83-657	7	1
QN84-2483	6	3
QN84-3588	5	2
QN84-4136	3	1
QN84-4146	8	1
QN84-4319	7	1
QN84-4736	7	1
QN85-1271	2	1
QN85-1819	9	1
QN85-2598	8	1
QN85-289	7	1
QN85-70	6	1
QN86-1009	8	1
QN86-1128	8	2
QN86-1336	7	1
QN86-1531	7	1
QN86-189	3	1
QN86-2158	4	1
QN86-2312	6	1
QN86-2313	6	2
QN86-424	7	1
QN86-5238	8	1
QN86-640	6	2
QN86-672	3	1
QN86-758	1	1

QN95-685	7	1
QN96-1050	7	1
QN96-1131	7	1
QN96-1253	7	1
QN96-1794	7	1
QN96-2047	7	1
QN96-556	7	1
QN96-768	7	1
QS78-1181	7	1
QS81-546	7	1
QS84-2134	7	1
QS84-2555	7	1
QS87-7245	7	1
QS87-7434	7	1
QS87-7505	7	1
QS89-7124	7	1
QS92-636	7	1
QS93-286	7	1
QS95-2122	7	1
QS95-2394	7	1
QS95-2473	7	2
QS95-276	7	1
QS95-520	7	1
QS96-6178	7	1
BN88-3291	8	2
CP44-101	8	1
H56-752	8	1
KQ95-4502	8	2
KQ97-7265	8	2
KQ98-2054	8	2
MIZSAND	8	1
MQ81-711	8	1
NCo310	8	3
PS84-16029	8	3
Q170	8	3
Q191	8	1
Q195	8	2
Q202	8	2
Q210	8	2
Q216	8	2
Q222	8	2
QA87-638	8	1
QA88-1399	8	1
QA90-2024	8	2
QA91-1091	8	1
QA91-1125	8	1
QA91-1130	8	1
QA91-3693	8	1
QA92-1160	8	1
QA92-1657	8	1
QA92-2301	8	1
QA93-1394	8	1
QA93-1945	8	1

QN87-1169	1	1
QN87-1415	8	1
QN87-1978	1	1
QN87-2109	4	2
QN87-881	7	1
QN88-1293	7	1
QN88-1296	7	1
QN88-1862	8	2
QN88-2097	1	2
QN88-2129	3	1
QN88-368	7	1
QN88-572	8	1
QN88-650	9	2
QN88-805	8	2
QN89-1043	6	2
QN89-1180	8	1
QN89-1281	9	2
QN89-1381	9	1
QN89-1641	7	1
QN89-169	6	1
QN89-1727	9	3
QN89-1765	8	1
QN89-181	8	2
QN89-1902	8	2
QN89-2208	7	3
QN89-2449	6	1
QN89-686	5	1
QN89-69	5	1
QN89-917	9	1
QN90-1230	6	2
QN90-1774	6	1
QN90-1849	9	1
QN90-395	8	1
QN90-492	6	1
QN90-840	8	2
QN90-920	7	1
QN91-1095	8	1
QN91-1298	4	1
QN91-295	3	1
QN91-3285	7	2
QN91-3381	8	1
QN91-3563	6	1
QN91-3851	8	1
QN91-3898	5	1
QN91-429	9	1
QN91-444	7	1
QN91-529	9	1
QN91-564	9	2
QN91-850	8	1
QN91-91	7	1
QN92-1234	1	2
QN92-1249	8	1
QN92-1461	8	1

QA93-2763	8	2
QA94-1169	8	1
QA94-1223	8	1
QA94-1483	8	3
QA94-6257	8	2
QA95-5119	8	1
QA95-5207	8	2
QC71-413	8	1
QC86-807	8	1
QC89-561	8	2
QC89-6002	8	1
QC90-258	8	1
QC92-1188	8	2
QC92-300	8	1
QC92-723	8	1
QC92-768	8	1
QC93-1594	8	1
QC93-455	8	3
QC94-1364	8	1
QC95-1188	8	1
QC95-1697	8	3
QC95-2212	8	1
QC95-3156	8	2
QC95-3182	8	1
QC97-1398	8	1
QC97-2059	8	1
QC98-2491	8	1
QC98-4214	8	1
QC98-4313	8	1
QH90-1261	8	2
QH91-7050	8	1
QH91-7055	8	3
QH92-1548	8	1
QH92-2386	8	1
QH92-2649	8	2
QH93-1533	8	2
QH94-1643	8	1
QH94-2440	8	1
QH94-2612	8	1
QN66-2008	8	2
QN78-228	8	1
QN80-617	8	1
QN84-4146	8	1
QN85-2598	8	1
QN86-1009	8	1
QN86-1128	8	2
QN86-5238	8	1
QN87-1415	8	1
QN88-1862	8	2
QN88-572	8	1
QN88-805	8	2
QN89-1180	8	1
QN89-1765	8	1

QN92-1542	9	2
QN92-157	4	1
QN92-1794	8	1
QN92-1881	9	1
QN92-2158	9	1
QN92-2219	8	1
QN92-2278	9	1
QN92-2367	6	1
QN92-2511	9	1
QN92-426	6	1
QN92-458	5	1
QN92-731	6	1
QN92-816	9	1
QN92-903	7	1
QN93-1057	9	1
QN93-1304	8	1
QN93-1392	9	1
QN93-309	6	1
QN93-3423	9	1
QN93-3542	9	1
QN93-3548	8	1
QN93-3670	4	2
QN93-3907	7	2
QN93-4111	7	1
QN93-4731	2	1
QN93-4779	9	2
QN93-4857	7	1
QN93-4931	9	1
QN93-5073	9	1
QN93-56	8	1
QN93-602	9	1
QN93-736	9	1
QN93-740	9	1
QN93-928	8	2
QN93-957	4	1
QN94-6006	5	2
QN94-6011	9	1
QN94-6016	7	1
QN95-1029	8	1
QN95-1250	6	2
QN95-1412	8	1
QN95-1479	9	2
QN95-1599	6	1
QN95-1633	9	1
QN95-1697	7	1
QN95-1700	9	1
QN95-1867	6	2
QN95-1896	6	1
QN95-523	8	1
QN95-6020	8	2
QN95-685	7	1
QN95-807	9	3
QN95-87	8	1

QN89-181	8	2
QN89-1902	8	2
QN90-395	8	1
QN90-840	8	2
QN91-1095	8	1
QN91-3381	8	1
QN91-3851	8	1
QN91-850	8	1
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QN92-1461	8	1
QN92-1794	8	1
QN92-2219	8	1
QN93-1304	8	1
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QN95-1412	8	1
QN95-523	8	1
QN95-6020	8	2
QN95-87	8	1
QN96-1232	8	1
QN96-15	8	1
QN96-1771	8	1
QN96-281	8	1
QN96-437	8	1
QS72-1058	8	2
QS84-1265	8	1
QS84-2788	8	1
QS85-2236	8	1
QS85-7102	8	1
QS85-7327	8	1
QS85-7335	8	1
QS87-7199	8	1
QS87-7268	8	1
QS87-7367	8	1
QS87-8090	8	1
QS88-9268	8	1
QS89-7738	8	1
QS89-7870	8	1
QS90-6002	8	1
QS90-6004	8	1
QS90-7146	8	1
QS90-7187	8	1
QS91-7347	8	1
QS92-2423	8	2
QS94-2395	8	1
QS94-2451	8	1
QS94-2614	8	2
QS94-2682	8	1
QS94-551	8	1
QS95-2552	8	1
QS95-2645	8	1

QN95-939	5	1
QN96-102	9	1
QN96-1050	7	1
QN96-1103	6	1
QN96-1131	7	1
QN96-1178	6	1
QN96-1184	9	1
QN96-1232	8	1
QN96-1253	7	1
QN96-15	8	1
QN96-1658	5	1
QN96-1771	8	1
QN96-1794	7	1
QN96-1835	6	1
QN96-2047	7	1
QN96-281	8	1
QN96-437	8	1
QN96-556	7	1
QN96-610	1	1
QN96-768	7	1
QN97-1754	6	1
QN97-2173	6	1
QN97-2328	1	1
QN97-863	6	1
QN99-1998	6	1
QS72-1058	8	2
QS78-1181	7	1
QS81-546	7	1
QS82-714	6	1
QS84-1265	8	1
QS84-2134	7	1
QS84-2555	7	1
QS84-2788	8	1
QS85-1509	4	1
QS85-1555	9	1
QS85-2236	8	1
QS85-7102	8	1
QS85-7327	8	1
QS85-7335	8	1
QS85-797	9	1
QS85-929	5	1
QS87-7144	9	1
QS87-7199	8	1
QS87-7245	7	1
QS87-7268	8	1
QS87-7367	8	1
QS87-7427	1	1
QS87-7430	6	1
QS87-7434	7	1
QS87-7505	7	1
QS87-8090	8	1
QS88-7073	3	2
QS88-7371	4	1

QS95-762	8	1
QS96-2015	8	1
QS96-73	8	1
QS97-233	8	1
QS97-7188	8	1
QW89-60	8	1
QW90-79	8	1
ROC1	8	1
BN88-3108	9	1
BN88-3347	9	1
ESK	9	1
MQ92-153	9	2
MQ94-13	9	1
MQ94-15	9	1
MQ94-414	9	1
MQ94-75	9	2
MQ94-80	9	1
MQ95-380	9	1
Q117	9	3
Q192	9	1
Q194	9	2
Q204	9	1
QA83-1992	9	1
QA86-700	9	1
QA88-1968	9	1
QA89-1746	9	1
QA89-3434	9	1
QA90-1227	9	1
QA90-548	9	1
QA91-1031	9	1
QA91-1367	9	1
QA91-1460	9	1
QA91-1549	9	1
QA92-1258	9	1
QA92-1361	9	1
QA92-1431	9	1
QA92-1639	9	1
QA92-2275	9	1
QA92-2395	9	1
QA93-1017	9	1
QA93-1018	9	2
QA93-1155	9	1
QA93-1780	9	1
QA93-1850	9	1
QA93-1856	9	2
QA93-2768	9	2
QA93-2795	9	1
QA94-1009	9	1
QA94-1076	9	1
QA94-1137	9	2
QA94-1221	9	2
QA94-6003	9	1
QA94-6552	9	1

QS88-9095	3	1
QS88-9268	8	1
QS89-7124	7	1
QS89-7651	9	1
QS89-7738	8	1
QS89-7870	8	1
QS89-8124	4	1
QS90-6002	8	1
QS90-6004	8	1
QS90-6006	5	1
QS90-7085	9	2
QS90-7146	8	1
QS90-7187	8	1
QS91-7172	5	1
QS91-7266	9	1
QS91-7347	8	1
QS92-2423	8	2
QS92-250	9	1
QS92-286	9	1
QS92-330	5	1
QS92-636	7	1
QS92-639	6	1
QS93-2188	3	2
QS93-2613	6	1
QS93-286	7	1
QS94-18	3	1
QS94-2167	6	2
QS94-2329	3	2
QS94-2395	8	1
QS94-2451	8	1
QS94-2614	8	2
QS94-2641	6	1
QS94-2682	8	1
QS94-498	9	1
QS94-551	8	1
QS94-876	5	1
QS94-91	6	2
QS95-2122	7	1
QS95-2394	7	1
QS95-2473	7	2
QS95-2552	8	1
QS95-2617	5	1
QS95-2645	8	1
QS95-276	7	1
QS95-520	7	1
QS95-6019	1	1
QS95-762	8	1
QS96-2015	8	1
QS96-2026	5	1
QS96-2174	1	2
QS96-2408	3	1
QS96-2787	1	1
QS96-2817	4	1

QA95-1603	9	1
QC84-252	9	1
QC85-877	9	1
QC86-137	9	2
QC86-281	9	1
QC86-501	9	2
QC87-598	9	1
QC88-138	9	1
QC90-743	9	1
QC91-2349	9	1
QC92-1287	9	1
QC92-778	9	1
QC92-928	9	1
QC93-1188	9	1
QC98-2025	9	1
QC98-2589	9	1
QH89-1688	9	1
QH90-1235	9	1
QH90-1258	9	2
QH91-1324	9	1
QH91-7027	9	1
QH92-1003	9	1
QH92-2284	9	1
QH93-1166	9	1
QH94-1455	9	1
QH94-2654	9	1
QN81-1750	9	1
QN83-1170	9	1
QN83-399	9	1
QN85-1819	9	1
QN88-650	9	2
QN89-1281	9	2
QN89-1381	9	1
QN89-1727	9	3
QN89-917	9	1
QN90-1849	9	1
QN91-429	9	1
QN91-529	9	1
QN91-564	9	2
QN92-1542	9	2
QN92-1881	9	1
QN92-2158	9	1
QN92-2278	9	1
QN92-2511	9	1
QN92-816	9	1
QN93-1057	9	1
QN93-1392	9	1
QN93-3423	9	1
QN93-3542	9	1
QN93-4779	9	2
QN93-4931	9	1
QN93-5073	9	1
QN93-602	9	1

QS96-457	6	1	QN93-736	9	1
QS96-6006	4	2	QN93-740	9	1
QS96-6176	5	1	QN94-6011	9	1
QS96-6178	7	1	QN95-1479	9	2
QS96-73	8	1	QN95-1633	9	1
QS96-788	6	1	QN95-1700	9	1
QS96-986	2	1	QN95-807	9	3
QS97-164	9	1	QN96-102	9	1
QS97-2033	6	1	QN96-1184	9	1
QS97-2067	6	1	QS85-1555	9	1
QS97-233	8	1	QS85-797	9	1
QS97-36	6	1	QS87-7144	9	1
QS97-7188	8	1	QS89-7651	9	1
QW89-60	8	1	QS90-7085	9	2
QW90-79	8	1	QS91-7266	9	1
QW90-8	9	1	QS92-250	9	1
ROC1	8	1	QS92-286	9	1
SP70-3370	6	1	QS94-498	9	1
SP79-2313	5	1	QS97-164	9	1
TS65-28	6	1	QW90-8	9	1

APPENDIX 3 - Mean rating for overseas varieties in ORIA smut trials and the number of trials in which the variety has been tested.

Sorted by Clone:		
Clone	**Rating**	**No. Trials**
68W1049	7	1
78F1025	7	1
84-608-10	3	1
89-247-5	1	1
89-393-1	1	1
89-393-3	1	1
89-518-6	1	1
89-680-3	1	1
89-680-6	1	1
90-77-5	4	1
90-83-5	2	1
B75-466	8	1
B77-602	5	1
B78-208	7	1
B79-474	1	1
B80-689	2	1
B83-262	7	1
B89-447	1	1
BBZ82-57	4	1
BJ70-15	4	1
BJ7452	6	1
BJ74-65	8	1
BJ75-04	5	1
BJ76-27	7	1
BJ82-119	7	1
BJ82-156	1	1
BJ82-26	6	1
BR82-30	8	1
BT65152	7	1
BT74-209	1	1
C1616-75	7	1
CC84-56	1	1
CC84-75	1	1
CC85-6311	2	1
CC85-68	1	1
CC87-251	3	1
CC87-409	6	1
CC87-505	1	1
CC93-4223	2	1
CCSP89-1997	1	1
CCSP89-259	2	1
C-GD-24	7	1
CL61-620	1	1
CL74-1217	7	1
CO1007	5	1
CO7709	1	1
CO7804	4	1
CO8231	1	1

Sorted by rating:		
Clone	**Rating**	**No. Trials**
89-247-5	1	1
89-393-1	1	1
89-393-3	1	1
89-518-6	1	1
89-680-3	1	1
89-680-6	1	1
B79-474	1	1
B89-447	1	1
BJ82-156	1	1
BT74-209	1	1
CC84-56	1	1
CC84-75	1	1
CC85-68	1	1
CC87-505	1	1
CCSP89-1997	1	1
CL61-620	1	1
CO7709	1	1
CO8231	1	1
CO8232	1	1
CP63-588	1	1
CP70-1143	1	1
CP72-356	1	1
CP75-1322	1	1
CP88-1540	1	1
CP88-1762	1	1
CP92-1641	1	1
DB701-72	1	1
DB83-119	1	1
FR96-033	1	1
FR96-238	1	1
H73-5659	1	1
H75-6104	1	1
H78-3567	1	1
H79-2583	1	1
H81-6025	1	1
H83-7206	1	1
H84-0778	1	1
H87-4094	1	1
HCP85-845	1	1
HoCP96-509	1	1
IAC58-480	1	1
L85-483	1	1
LCP85-384	1	2
LCP86-454	1	1
M1030/71	1	1
M1176/77	1	1
M96/82	1	1
MS70-611	1	1

CO8232	1	1
CP63-588	1	1
CP67-412	7	1
CP70-1143	1	1
CP72-2086	8	1
CP72-356	1	1
CP74-2005	2	2
CP75-1082	8	1
CP75-1322	1	1
CP81-1405	5.5	2
CP86-1633	5	1
CP88-1409	4	1
CP88-1508	6	1
CP88-1540	1	1
CP88-1762	1	1
CP89-2376	3	1
CP89-2377	8	2
CP92-1213	5	1
CP92-1641	1	1
CP92-1666	3	1
CP94-1100	7	1
CP94-1340	7	1
CP94-1607	2	1
CP94-2059	8	1
CP95-1569	4	1
CR74-250	6	1
D84-15	9	1
DB701-72	1	1
DB71-60	6	1
DB75-159	3	1
DB78-69	8	1
DB83-119	1	1
EAK7076	8	1
F172	5.5	2
F177	8	1
FR95-0245	3	1
FR96-033	1	1
FR96-065	8	1
FR96-238	1	1
H51-8194	2	1
H60-3802	3	1
H70-6957	7	1
H73-3775	6	1
H73-5659	1	1
H73-6110	2	1
H74-4527	5	1
H75-6104	1	1
H78-3567	1	1
H78-3606	2	1
H78-7234	8	1
H79-2583	1	1
H79-7808	7	1
H80-4551	6	1

N14	1	1
N17	1	1
N22	1	1
N23	1	1
N26	1	1
N33	1	1
N37	1	1
PS79-82	1	1
R570	1	1
R85-1124	1	1
R86-0538	1	1
ROC10	1	1
ROC11	1	1
ROC9	1	1
SP71-8210	1	1
SP80-1816	1	1
SP80-1836	1	1
SP80-3280	1	1
SP83-5073	1	1
SP84-1431	1	1
SP85-3877	1	1
SP86-155	1	1
SP87-344	1	1
SP89-1116	1	1
TC5	1	1
TUC71-7	1	1
TUC74-24	1	1
VMC67-315	1	1
VMC71-238	1	2
VMC76-16	1	1
VMC87-599	1	1
VMC93-313	1	1
90-83-5	2	1
B80-689	2	1
CC85-6311	2	1
CC93-4223	2	1
CCSP89-259	2	1
CP74-2005	2	2
CP94-1607	2	1
H51-8194	2	1
H73-6110	2	1
H78-3606	2	1
M1400/86	2	1
R80-0235	2	1
VMC84-947	2	1
84-608-10	3	1
CC87-251	3	1
CP89-2376	3	1
CP92-1666	3	1
DB75-159	3	1
FR95-0245	3	1
H60-3802	3	1
N29	3	1

H81-6025	1	1
H83-7206	1	1
H84-0778	1	1
H85-7362	7	1
H87-4094	1	1
H87-4319	4	1
HCP85-845	1	1
HCP91-555	4	1
HoCP96-509	1	1
IAC52-150	8	1
IAC58-480	1	1
JA64-19	6	1
L85-483	1	1
LCP85-384	1	2
LCP86-454	1	1
LF68-10140	7	1
M1030/71	1	1
M1176/77	1	1
M1186/86	8	1
M1246/84	8	1
M1334/84	8	1
M1394/86	7	1
M1400/86	2	1
M1551/80	8	1
M1565/87	4	1
M1658/78	8	1
M2024/88	8	1
M2119/88	8	1
M2350/79	7	1
M261/78	7	1
M447/67	4	1
M52/78	6	1
M96/82	1	1
MS70-611	1	1
N14	1	1
N17	1	1
N18	5	1
N19	8	1
N21	5	1
N22	1	1
N23	1	1
N24	7	1
N25	7	1
N26	1	1
N27	7	1
N28	5	1
N29	3	1
N30	5	1
N31	7	1
N33	1	1
N35	6	1
N37	1	1
PHIL66-07	7	1

R85-1238	3	1
SP70-1284	3	1
SP79-2313	3	1
SP80-185	3	1
SP81-1763	3	1
SP84-2025	3	1
SP87-365	3	1
TCP87-3388	3	1
VMC73-229	3	1
90-77-5	4	1
BBZ82-57	4	1
BJ70-15	4	1
CO7804	4	1
CP88-1409	4	1
CP95-1569	4	1
H87-4319	4	1
HCP91-555	4	1
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M447/67	4	1
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ROC13	4	1
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SP80-1842	4	1
SP81-3250	4	1
SP89-1115	4	1
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BJ75-04	5	1
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N28	5	1
N30	5	1
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SP92-3796	5	1
SP92-4147	5	1
VMC95-09	5	1
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CC87-409	6	1
CP88-1508	6	1
CR74-250	6	1
DB71-60	6	1
H73-3775	6	1
H80-4551	6	1
JA64-19	6	1

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PS79-208	8	1
PS79-82	1	1
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PS80-847	8	1
PS81-1337	8	1
PS81-5132	6	1
PS82-13	6	1
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RB78-5148	7	1
RB80-5004	7	1
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ROC13	4	1
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ROC16	7	1
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SP79-2233	7	1
SP79-2313	3	1
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RB73-9735	6	1
RB76-5418	6	1
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ROC17	6	1
SP85-5077	6	1
SP90-1638	6	1
TUC72-16	6	1
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BJ76-27	7	1
BJ82-119	7	1
BT65152	7	1
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C-GD-24	7	1
CL74-1217	7	1
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ROC15	7	1
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SP87-396	7	1
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TS68-830	8	1
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TUC74-24	1	1
VMC67-315	1	1
VMC71-238	1	2
VMC73-229	3	1
VMC76-16	1	1
VMC84-947	2	1
VMC87-599	1	1
VMC93-313	1	1
VMC95-09	5	1

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CP75-1082	8	1
CP89-2377	8	2
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FR96-065	8	1
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M1551/80	8	1
M1658/78	8	1
M2024/88	8	1
M2119/88	8	1
N19	8	1
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SP84-5560	9	1