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HOW RAMSBOTTOM GAVE NEW LIFE TO THE NARCISSUS

by

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HALF a century ago, in the 1917 bulb season to be precise, JAMES KIRKHAM RAMSBOTTOM made a name for himself by being the first man to treat eelworm infested narcissus bulbs successfully on a commercial scale. He did this by immersing the bulbs in hot water. This fabulous achievement opened a new era in the commercial growing of the daffodil. On hearing the good news of his success, many disheartened growers, were inspired by the newly awakened hope that daffodil stocks, infested with eelworm, could be cured.

The great importance of RAMSBOTTOM's work in this field must not be underrated, and in order to commemorate the fiftieth anniversary of this great stride forward, it may be of interest to review the early history of this pernicious disease and the ways and means by which RAMSBOTTOM pioneered the search for a remedy.

It was at the 1887 Conference of the Royal Horticultural Society in London, that many of the Committee members expressed growing alarm. Their attention had been directed to "a disease then very prevalent among narcissi, sometimes described as the 'rootless disease'".

The results of the ailment were so disastrous that the attention of the R.H.S. was earnestly requested, "with a view to ascertaining its origin, and the means to be adopted for its prevention or cure".

This may well have been an outbreak of eelworm disease but in the absence of contemporary scientific evidence, the matter remains uncertain.

In 1889, in a letter to PETER BARR, referring to a "Mysterious disease" BURBIDGE of Dublin writes "The London Market gardeners lose many *jonquille* roots, both single and double; they "go off" this way and there seems to be no cure."

In 1894 in an article on "basal rot" the Rev. WOLLEY DOD mentions the word eelworm, whether it was free-living or of a parasitic nature was not stated.

In 1901, P. D. WILLIAMS of Lanarth, writes in his personal diary:

"In February we noticed some of our bulbs of two years standing looked weak, so we decided to examine them, since those we moved from the same bed the previous year appeared to be in good health". After making further investigations he concludes: "The cause of the decay is that the grubs of the Narcissus Fly excrete an acid which rots the bulb, the rotten matter is full of mites and in some cases eelworms".

Whilst I myself appreciate that the presence of fungi and eelworms is not uncommon in decayed tissues and that these eelworms might have been scavengers, it remains a possibility that this was a genuine eelworm attack, since P. D. WILLIAMS told me that soon after the turn of the century he sustained serious losses in his seedlings. He surmised his stocks had been heavily infested with eelworm.

His friend ALEC WILSON, another well-known hybridiser, writing his "Recollections of the early years of this century", mentions that of his friend E. M. CROSFIELD the flowers were always exhibited in first class form and condition, but then, his stocks were smitten with eelworm before the hot water treatment was known, and he was so disheartened that he gave up daffodil growing altogether. He continues further: "I, too, know something of the damage eelworm can do, for about that time, my stocks became badly infected. I tried every suggested remedy; but nothing prevailed against it. My stocks were valued for Income Tax purposes at £12,000 and two years later I had not £200 worth left". So, in the words of Rudyard Kipling: "I saw the things I gave my life to broken" and "had to stoop to build them up with worn out tools!" I can not help thinking that eelworm in those days was of a more virulent type than it is now. Thirty years ago, (1909) it was a terrible scourge, a veritable Black Death among daffodils.

Around the same time many of his contemporaries had "trouble" too and since they generously presented one another with bulbs, and freely interchanged their novelties, unintentionally "the disease" (as it was then called) spread like wildfire.

The situation became so critical that the Rev. JOSEPH JACOB proposed a resolution at the R.H.S. Narcissus and Tulip Committee on 28th March 1916, requesting Council to cause investigations to be made.

The result of this resolution was that the Council agreed to start experiments at Wisley to investigate the life history of the daffodil eelworm and discovering the best means of killing the pest without killing the daffodil bulb infested by it.

J. K. RAMSBOTTOM, who was a student at Wisley at the time, was accordingly invited to undertake the post of "investigator" and

asked to devote to it his whole attention. He soon found out that it was not "Fusarium" which was the cause of the trouble but eelworm.

The malady also caused grave concern in Holland. Professor Dr. RITZEMA BOS wrote a most interesting article (in Dutch) on eelworm disease in daffodils in the issue of *Tijdschrift over Plantenziekten*, 23ste jaargang, 1917, from which I quote (freely translated): "As regards the *Amaryllidaceae*, we are now particularly interested in the narcissus. In the time of which I spoke (1884–90) and a long time after, daffodil growers took it as an established fact that all sorts and varieties were immune from eelworm disease. At the time I took soil from a field where rye constantly suffered from rye eelworm in which I planted a number of trumpet daffodils and tazetta narcissus. Later, in none of the trumpet daffodils could I discover eelworm; in some of the tazetta narcissus however I did discover eelworm, but probably too few in number to have been capable of showing external symptoms. This is all the more surprising when we remember that at present (1917) the daffodil has become the species which suffers most from eelworm and to which the disease threatens to become fatal."

This to my knowledge is the first eelworm infection on record. I have been unable to find outbreaks of eelworm infection recorded in Holland in the early years of the present century. I recollect vividly however, in 1913, my father identifying eelworm infestation in narcissus bulbs which he had recently procured. They were small numbers of 'Will Scarlett', 'Masterpiece' and 'Red Beacon', all rather expensive at the time. After convening a family council, at my mother's suggestion, the bulbs were put in a gently heated oven. Whether it killed the eelworms I could not say, but it certainly killed the bulbs. I remember helping to lift, during growth, a badly infested and newly acquired stock of 'Sir Watkin'. The bulbs were carted into barges and taken to a factory to be converted into starch during the 1914–18 war. It also recurs to my mind that at my uncle's where I used to spend my working holidays, his stocks were among the first to be cursed with the trouble, to such an extent, that within a very short time, there was not a bulb left on the place.

In 1917 the good news spread that RAMSBOTTOM had made satisfactory progress with his trials at Wisley and found that a hot water treatment of sufficient duration would control eelworm in infested narcissus bulbs.

He concentrated on the conditions necessary for the treatment to be applied with the minimum injury to the bulb, which proved to be a rather narrow margin. Hot water treatment as such was, however,

not his invention. A similar method had already been in use since 1880, in a primitive way, in Scotland at Lord Lamington's Estate, to treat "Eucharis Amazonica" against Eucharis or Tarsonemis mite. (See R.H.S. *Daffodil and Tulip Year Book* 1965, page 187.).

The effectiveness of hot-water treatment of cereals for the control of smuts was discovered by J. L. JENSEN of Denmark in 1907, whereas in Germany "Lily of the Valley" were given a hot-water treatment before forcing.

Mr. J. C. F. FRYER, entomologist to the board of Agriculture, carried out experiments for the control of bulb fly larvae and found that immersion for one hour at 110°F. was efficient. (See R.H.S. *Daffodil Year Book* 1915, pages 22 and 24).

According to the minutes of the meeting of the R.H.S. Daffodil and Tulip Committee 11th April 1917, on the motion of the Rev. G. H. ENGLEHEART the following resolution was adopted unanimously:

"That the Narcissus and Tulip Committee request the Rev. W. WILKS, to advise the Council to abandon the Daffodil Show fixed for 17th April. To this the Council agreed. Concerning Mr. J. K. RAMSBOTTOM's lecture "Investigations on the Narcissus Disease", arranged to be given during the afternoon of the Daffodil Show, the Hon. Secretary was requested to endeavour to arrange for the lecture to be delivered at the Horticultural Club on 8th May 1917, as it was of great importance that the latest information should be made public as early as possible.

On 8th May 1917, RAMSBOTTOM read his historic paper before the Horticultural Club and a full report can be read in the R.H.S. *Journal* Vol. XLIII. part 1, May 1918, page 51.

I quote the following extracts: "On taking up my appointment a note was published in the leading Horticultural Papers inviting bulb growers to forward diseased specimens to Wisley". (See a most interesting article in the *Gardeners Chronicle*, 19th August 1916, by A. J. BLISS.) "As a result of the splendid response of the growers, hundreds of bulbs passed through my hands even during the first weeks of the investigation and thousands of slides were prepared. I was also given the opportunity of visiting a number of nurseries and bulb farms and given practically a free hand on the approach of the lifting season. It is with much pleasure that I acknowledge the great assistance and exceptional courtesies I have received from many growers."

"Special attention was centred on the possibility of Fusarium being the cause of the disease, but it was soon seen that this fungus was of

a remarkably rare occurence. When it was present it was always in connection with the parasitic eelworm and it was first thought that there was possibly some connection between the two organisms. As the work advanced, observations in the field and laboratory showed that the parasitic eelworm was the main factor to be considered."

In 1888, Prof. Dr. RITZEMA BOS, the Dutch nematologist, proved that *Tylenchus hyacinthus*, *Tylenchus allii* and *Tylenchus devastratix* were one and the same species. In a valuable contribution, "L'Anguillule de la Tige", he gives a list of some forty plants which are susceptible to attacks of *Tylenchus devastratix*. This list includes, among our principal food crops, rye, oats, onions and clover; barley and wheat to a less degree. Narcissus however is not mentioned.

I quote: "It will be of interest to hybridists to mention the fact that *Tylenchus* has been found in both the mature and immature carpels of the flower. In the mature carpel examined, no seeds had formed, but it is quite possible that had seeds developed they would have contained eelworms. This judging from the analogous case of oats, which when affected in the grain, gives the plant an appearance as though attacked by ergot".

"*Tylenchus* can be dried for lengthened periods looking as if dead, yet still retaining the power of resuming vital functions on being moistened. As far back as 1744 this power possessed by eelworms was investigated." I think it has been found that eelworm is not carried in narcissus seeds.

After describing various trials RAMSBOTTOM continues: "This question of how such a common species as *Tylenchus devastratix* suddenly became rampant amongst narcissus bulbs is one of those problems which often face pathologists in general. Where did the variation occur, in narcissus, in *Tylenchus* or in both?" This has puzzled me too, since, to my knowledge, eelworm infection has never been discovered in narcissus collected from the wild. In my early days on many occasions I searched the Alpine slopes and pastures, but never have I been able to discover eelworm-infested narcissus growing in their natural habitat.

RAMSBOTTOM winds up his lecture by saying: "Many bulb growers look upon the disease as 'one of Nature's gifts' and are of the opinion that the bulbs will ultimately right themselves. Suffice it to say that if the bulbs are left to right themselves, the bulb industry will soon cease to exist."

On page sixty-five of the aforementioned Journal, RAMSBOTTOM gives a résumé of his "Experiments on the Control of Eelworm

Disease of Narcissus at Wisley" of which I will quote some extracts: "The ease with which eelworms could be killed by direct heat led the writer to believe that soaking the bulbs in warm water might lead to a possible means of control". It was decided to experiment with three ranges of temperature, viz. 110–111°F., 114–115°F. and 119–120°F. but from these experiments it appeared that a very high temperature is not necessary in order to kill the eelworms in affected bulbs."

Eventually he arrives at the following "conclusion": "The preventive methods which promise best results is that of soaking the bulbs for a period of from two to four hours in water at a constant temperature of 110°F. and providing a suitable apparatus be found so that the bulbs may be given correct treatment; it will afford an economical means of combating the disease. At the same time it must be pointed out that this soaking will not prevent attack by eelworms present in the soil. Other experiments are on foot this autumn and the treatment of infected ground, and susceptibility of crops to attack, are phases of the subject which are under experiment."

After half a century his principle still holds and has practically not been amended except that his middle range temperature 114–115°F. for four hours has since been found to give more satisfactory results. RAMSBOTTOM duplicated his trials in the Spalding district where he further worked out his projects of narcissus eelworm control by hot water treatment. The Lincolnshire growers showed a great interest in his work and gave him every support. The news of his successful work rapidly spread far and wide and even attracted overseas visitors, to come to gather data, investigate and thoroughly study his experiments and methods.

He stayed with the late HEBER CLARK and carried out many trials at this nursery, as well as at those of J. T. WHITE & SONS, LTD., and SEYMOUR COBLEY, LTD. This involved the development of special apparatus. The original tanks which he used were in existence up to two years ago. The Charles Hearson bulb baths were efficient but only for small scale work, up to 3 cwt. per load.

Whilst I was apprenticed to the SPALDING BULB CO., Spalding, I sterilized narcissus bulbs one season from mid-August until October, working four small bulb baths in succession from early morning until late evening; other growers installed complicated apparatus with 10 cwt. tanks and circulating water pumps. It is recorded that on six acres of land near Spalding the treated bulbs, though not killed, lay more or less dormant for a year without the foliage pushing through the surface of the soil. Faced with such field problems RAMSBOTTOM

spent much time solving many mysteries for about five years. It was at this stage that most of the treatment apparatus was scrapped and replaced by the Badford and Perkins apparatus designed for GEORGE MONRO, LTD., and SEYMOUR COBLEY, LTD., where RAMSBOTTOM had made his headquarters.

I have on my desk a copy of a letter written by Mr. SEYMOUR COBLEY on the 20th June 1919, in reply to a letter from Mr. ALEC WILSON, already mentioned, from which I quote:

"In reply to your letter of the 18th June 1919, addressed to Mr. GEORGE MONRO, no soaking experiments have been successful. I have asked Mr. RAMSBOTTOM to write you separately on that point." He continues:

"We have a plant erected ourselves, in which we have quite successfully treated our narcissus bulbs in large quantities, but we do not make a practice of giving information to competitors or sterilizing bulbs for them. The situation with you of course, is quite different and if you have any choice varieties which you suspect of being diseased, it will give us great pleasure to sterilize them for you at cost. If you plant them back in clean uninfested soil, we think that you will find that the treatment has successfully eradicated the disease. We saved the whole of our stocks two years ago in 1917."

In the same year P. D. WILLIAMS' complete collection, consisting of some two thousand varieties was sterilized and saved under RAMSBOTTOM's supervision. Many of these varieties were later named and grown into healthy stocks. My father acting as P. D. WILLIAMS' agent introduced a number of them to the growers in Holland at fantastic prices. It may be of added interest that several of them have maintained themselves and 'Carlton', for one, occupies a larger acreage than any other commercial variety in cultivation.

In 1924, in appreciation of his invaluable work, the R.H.S. honoured JAMES KIRKHAM RAMSBOTTOM with the Peter Barr Memorial Cup. Never was an honour more fully deserved than this and it is an uplifting experience to pause for a moment and consider the enormity of the debt that we owe to the labours of this dedicated pioneer.

That this unassuming and amiable young scientist should die in New York while on a lecture tour in U.S.A., in 1925, at the age of thirty-three with so much already achieved, was not only a tragedy, but a grievous loss to the narcissus industry that no man can measure.