The effect of gibberellic acid, paclobutrazol and ethephon on the germination of Fagus sylvatica and Picea sitchensis seeds exposed varying durations of chilling

Seeds from two Fagus sylvatica seed lots were moist chilled (prechilled) at restricted moisture content (33% mc) for, respectively, 10 and 16 weeks. After prechilling, seeds were fully imbibed and germinated at 5 and 15 °C in solutions of ethephon, GA3, paclobutrazol or destilled water (control). Germination, i.e. radicle protrusion, was monitored after different durations of prechilling, i.e. at different seed dormancy levels. In F. sylvatica seeds, GA3-application exerted a stronger dormancy alleviating effect than that achieved by ethephon-application, but it could not fully substitute for the cold requirement. No effect of GA3 was achieved in non-dormant seeds. Ethephon reduced dormancy and significantly stimulated germination rate of dormant as well as non-dormant seeds. Paclobutrazol prolonged the cold requirement but, like GA3, had no effect in non-dormant seeds. Picea sitchensis seeds, exhibiting conditional dormancy, were imbibed in ethephon, GA3 and paclobutrazol subsequent to 0, 7, 14 or 21 days of prechilling. No effect was observed of GA3 at any of the concentrations used at either 15 or 20 °C. On the contrary, paclobutrazol delayed P. sitchensis seed germination after 0, 7 and 14 days prechill. Subsequent to 21 days prechill, paclobutrazol did not delay germination at 15 °C and only slightly delayed it at 20 °C. A portion of P. sitchensis seeds were imbibed and prechilled in paclobutrazol for 14 days and subsequently imbibed and germinated in water at 15 °C. Germination of these seeds did not differ from control seeds, prechilled 14 days in water, suggesting that gibberellin biosynthesis is more crucial for radicle protrusion when imbibed at temperatures suitable for germination. Like GA3, ethephon showed no effect on germination of P. sitchensis seeds.